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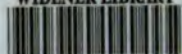
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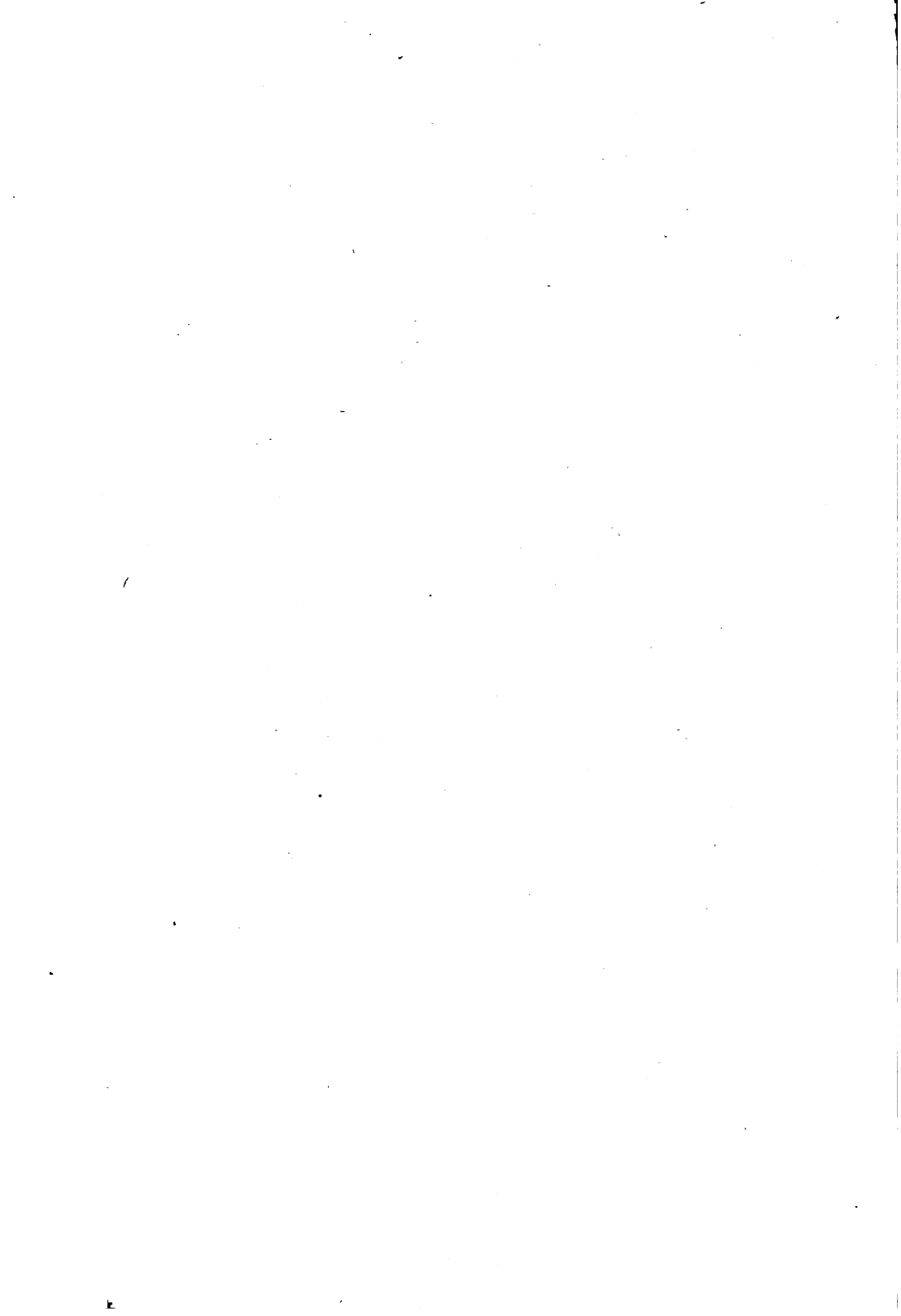


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REPORT OF THE PROCEEDINGS

OF THE

FORTY-SEVENTH ANNUAL CONVENTION

OF THE

MASTER CAR BUILDERS' ASSOCIATION

HELD AT

ATLANTIC CITY, N. J.,

JUNE 16, 17 AND 18,

1913

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PART 2.

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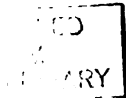
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# CODE OF RULES

GOVERNING THE CONDITION OF, AND REPAIRS TO,  
FREIGHT CARS FOR THE INTERCHANGE  
OF TRAFFIC,

ADOPTED BY THE

**MASTER CAR BUILDERS' ASSOCIATION.**

REVISED AT ATLANTIC CITY, N. J., JUNE, 1913.

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## PREFACE.

These rules make car owners responsible for, and therefore chargeable with, the repairs to their cars necessitated by ordinary wear and tear in fair service, so that defect cards will not be required for any defects thus arising.

Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident, and for improper repairs made by them, and they must make proper repairs at their own expense, or issue defect card covering all such damage or improper repairs.

Inspection of freight cars for interchange and method of loading will be in accordance with this Code of Rules, the Specifications for Tank Cars and the Loading Rules, issued by this Association.

---

## CARE OF FOREIGN FREIGHT CARS.

**RULE 1.** Each railway company must give to foreign cars, while on its line, the same care as to inspection, oiling, packing, adjusting brakes and running repairs that it gives to its own cars.

## INTERCHANGING FREIGHT CARS.

**RULE 2.** Cars having defects for which delivering company is responsible must be properly carded when offered in interchange.

Empty cars offered in interchange must be accepted if in

safe and serviceable condition, and the receiving road to be the judge. Owners must receive their own cars, when offered home for repairs, at any point on their lines, subject to the provisions of these rules.

Loaded cars offered in interchange must be accepted, with the following exceptions:

(a) Cars (whether loaded or empty) having defects in violation of the Safety Appliance Act, should not be offered in interchange.

(b) Cars loaded with explosives shall be handled in accordance with the regulations of the Interstate Commerce Commission.

Leaking tank cars containing inflammable liquid must be repaired or transferred without any unnecessary movement, or at nearest available point, with least possible risk.

Tank cars (empty or loaded) shall be rejected after January 1, 1915, if the safety valves are not stenciled to show adjusted, etc., within the time limit required by paragraphs 5, 6 and 7 of the M. C. B. Specifications for Tank Cars.

(c) Cars improperly loaded, when not complying with the Loading Rules, or when transfer or rearrangement of lading is necessary.

(d) Lading of open cars when dimensions of lading are in excess of published clearances of roads over which the shipment is destined.

(e) When cars can not pass approved third rail clearances of American Railway Association.

A. R. A. Car Service Rule 15 to apply (see page 735) when transfer or rearrangement of lading is necessary.

The car transfer check authorizing transfer or rearrangement of lading to be of the form shown on page 724.

When the lading is transferred by the receiving line, the car, when empty, may be returned to the delivering line.

In case cars are rejected by the receiving road and returned to the delivering company, all of the defects objected to must be designated on a return card of the form shown on page 725, filled in with ink or black indelible pencil, and placed on car adjacent to the destination card.

### USE OF DEFECT, BILLING REPAIR AND JOINT EVIDENCE CARDS.

**RULE 3.** If a car has defects for which the owners are not responsible, the receiving line shall require that a defect card be securely attached to the car, as per Rule 14.

Defect cards shall not be required for any damage that is so slight that no repairs are necessary.

**RULE 4.** Defect cards shall not be required for material missing from cars offered in interchange, except as provided for in Rules 46 and 57. Neither shall they be required of the delivering company for improper repairs that were not made by it, with the exception of cases provided for in Rules 35, 58, 66 and 70.

**RULE 5.** Defect cards must be of the form shown on page 725. They must be of cardboard, printed in red ink on both sides, and must be filled in on both sides with ink or black indelible pencil. The cards must plainly specify in full each item for which charges are authorized, indicating the location of defects, as provided for in Rule 14.

Use of  
Defect Card.

**RULE 6.** Any road making partial repairs of defects on a car which are covered by defect cards will have the defects repaired crossed off the original card with ink or indelible pencil and card replaced on car. A copy of the card accompanying the bill with the defects which were not repaired crossed off will be sufficient authority to bill.

**RULE 7.** When repairs of any kind are made to foreign cars a billing repair card must be made out. This card must specify fully the repairs made, the reason for same, the date and place where made and name of road making repairs; also show location of parts repaired or renewed, as per Rule 14.

If no bill is to be rendered, the billing repair card must be attached to the monthly bill, with the words "no bill" written across the face of the card.

Use of Billing  
Repair Card.

**RULE 8.** The billing repair card shall be made in duplicate, the original to be known as the billing repair card and the duplicate to be known as the record repair card, and to be of the forms shown on pages 729 and 730, the items of repairs to be in handwriting.

**RULE 9.** The following information must be specified on billing repair cards:

Use of Billing Repair Card.	M. C. B. couplers, or parts thereof, R. and R. ....	New or secondhand.
		Size of shank. (Where 12¼-inch head coupler is applied or removed, it must be so stated.)
	Wheels and axles, R. and R. ....	Yoke, stem or key attachment.
		Cast-iron, cast-steel, rolled or forged steel or steel-tired wheels.
	Journal bearings .....	New or secondhand.
		Cause of removal (see Rule 10).
		Solid, filled or other kind, R. and R.
	Metal brake beams or parts thereof, R. and R. ....	Length of journal.
		Box number (see Rule 14).
		Make or name of beam.
		New or secondhand.
	Brake shoes, applied.....	Complete, or part or parts.
		Cause of renewal.
		Part or parts scrapped.
		Cast or reinforced back.
	Triple valve, R. and R.....	Make and type. (Need not be shown when cleaned only.)

When triple valve or cylinder is cleaned, the initial of road and date of last previous cleaning must be shown.

If necessary to remove load to make repairs, as specified in Rule 107, it must be plainly stated.

**RULE 10.** In noting the cause of removal of wheels and axles, the terms used in Rules 68 to 86, inclusive, shall be used.

In all cases of forged or rolled steel wheels, the actual thickness of tread must be shown before and after turning off, measured from the base line of tread to the condemning limit of tread, which is ¼ inch above the witness groove; also show actual thickness of tread on other wheels applied. This information must be reported to car owners regardless of whether or not repairs are chargeable to owners.

**RULE 11.** Journal bearings having a babbitt lining ¾ inch thick or thicker, shall be charged as filled journal bearings, and not as solid journal bearings.

**RULE 12.** The evidence of a joint inspector, or the joint evidence of two inspectors, one representing the owner of the car and the other representing a railroad company, that the repairs are not proper, shall be final; the evidence to be signed only after an actual inspection has been made.

A joint evidence card shall be used for this purpose, which

Use of  
Joint Evidence  
Card.

shall describe and show location of parts repaired or renewed, as per Rule 14. This card shall be of the form shown on page 725.

If repairs are not corrected at time of the inspection, the joint evidence card shall be attached to the car, as per Rule 14.

RULE 13. The joint evidence card showing copy of billing repair card, covering wrong repairs, when wrong repairs have been corrected, shall be sent to the company issuing such billing repair card, and it shall issue M. C. B. defect card.

Use of  
Joint Evidence  
Card.

RULE 14. The end of car toward which the cylinder push rod travels shall be known as B end and the opposite end shall be known as A end.

Facing the B end of car, in their order on the right side of car, the journal boxes and contained parts shall be known as R1, R2, R3 and R4, and similarly those on the left side of car shall be known as L1, L2, L3 and L4.

Defect cards and joint evidence cards must be securely attached to the car with at least four tacks, preferably on the outside face of intermediate sill between cross-tie timbers on wooden cars, and on steel cars to cardboard located either on cross-tie under car or on inside of side sill at the end of car.

RULE 15. Duplicate defect or billing repair cards must be furnished promptly on request or joint evidence for lost or illegible cards.

#### GENERAL INSTRUCTIONS.

RULE 16. Any car having defects which render it unsafe to run, unsafe to trainmen, or to any lading suitable to the car, may be repaired.

Repairs to foreign cars shall be promptly made, and the work shall conform in detail to the original construction, and with the quality of material originally used, except as provided for in Rules 17 and 18.

RULE 17. In repairing foreign cars, M. C. B. Standards may be used when of dimensions that do not impair the strength of cars, in lieu of the parts forming their original construction.

When using materials for repairs to foreign cars for which the Master Car Builders' Association has adopted specifications as a standard, the materials must comply with the requirements of these specifications.

Malleable iron M. C. B. Standards may be substituted for gray iron M. C. B. Standards, but the net cost to the car owner in such cases must be no greater than if the original kind and weight of material had been applied. Gray iron M. C. B. Standards may be substituted for malleable M. C. B. Standards, but

in such cases the debits and credits must be for what is actually applied and removed. Billing repair card must state kind of material applied and removed.

When necessary to renew brake beams, any metal brake beam meeting M. C. B. specifications may be used, provided that the beam applied is as strong as the beam standard to the car and does not require any change in hangers or other details.

Cast-iron brake shoes may be replaced with brake shoes with reinforced back, in repairs to foreign cars.

Cars built after October 1, 1914, not equipped with either No. 1 or No. 2 brake beams, will not be accepted in interchange.

White pine, yellow pine, fir or cypress may be used when repairing siding on foreign cars when of equal grade or quality to the material standard to the car. Fir or oak may be substituted for pine when splicing longitudinal sills.

**RULE 18.** Couplers of the vertical plane type, other than M. C. B. Standard, when replaced with M. C. B. Standard, the expense of alteration thus necessitated shall be chargeable to car owners.

Couplers with stem attachments may be replaced with pocket attachment.

Cars having couplers with stem or spindle attachments or American continuous draft rods will not be accepted in interchange after October 1, 1914.

Couplers that exceed the distance of  $5\frac{1}{8}$  inches between point of knuckle and guard arm, measured perpendicularly to guard arm, must have the defective part or parts renewed to bring coupler within gauge, in which case owners are responsible. (See drawing on next page.)

When M. C. B. couplers of another make are applied to a car, the uncoupling arrangement shall be made operative at the expense of the company making the repairs.

**RULE 19.** In making repairs to foreign cars, the following materials shall not be used:

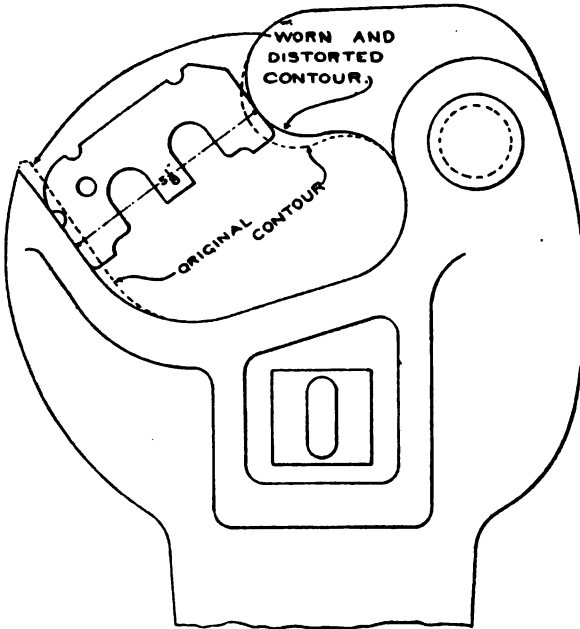
Malleable iron couplers.

Open knuckles.

Malleable or steel-backed journal bearings.

**RULE 20.** Any company finding cars not within the limits of standard height for couplers, may make repairs and charge to owners.

Cars must be maintained within the limits of standard height for couplers, measured from the top of the rails to the center line of coupler head. As far as possible, cars should be adjusted when empty.



Empty cars measuring  $32\frac{1}{2}$  inches or less shall be adjusted to  $34\frac{1}{2}$  inches, or as near as practicable thereto, but not exceeding  $34\frac{1}{2}$  inches. Loaded cars measuring  $31\frac{1}{2}$  inches or less shall be adjusted to  $33\frac{1}{2}$  inches, or as near as practicable thereto, but not exceeding  $33\frac{1}{2}$  inches. When bill is to be rendered, the height of car before and after altering must be shown on billing repair cards.

**RULE 21.** Bills may be rendered against car owners for the cost of applying temporary running boards and hand rails to cars originally equipped with roofs or running boards to make such cars safe for trainmen, when owners are responsible for the defective condition of the roof.

**RULE 22.** Draft timbers must not be spliced. Longitudinal sills may be spliced at both ends, except that not more than two adjacent sills may be spliced at same end of car. The splicing of any sill between cross-tie timbers will not be allowed.

The splice may be located either side of body bolster, but the nearest point of any splice must not be within 12 inches of the same, excepting center sills, which must be spliced between body bolster and cross-tie timber, but not within 24 inches of body bolster.

In splicing longitudinal sills other than center sills, if same are less than 12 inches in depth, the plan shown in either Fig. 8 or 9C shall be followed. If the sills are 12 inches or more in

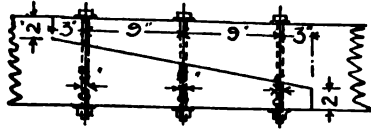


FIG. 8.

depth, the plan shown in either Fig. 9 or 9C shall be followed. In splicing center sills the plan shown in Fig. 9B shall be followed.

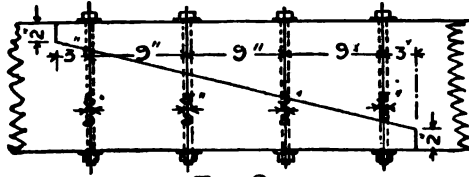


FIG. 9.

The size of horizontal or cross bolts should be  $\frac{3}{8}$  inch.

Sills of foreign cars shall be spliced as above provided.

Cars delivered in interchange with center sills spliced in accordance with Fig. 9A will be accepted.

Steel sills may be spliced in accordance with Figs. A, B, C and D. Adjacent sills may be spliced.

The splice for center sills, except as otherwise herein stated, to be located not less than 7 inches from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end, but not exceeding 24 inches, and not less than thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. A and B.

Fig. A shows the method of splicing center sills in front of body bolster.

Fig. B shows the method of splicing center sills back of body bolster.

Fig. C shows method of splicing in cases where cars are damaged to such an extent that the center sills have to be cut off less than 8 inches from the front side of the body bolster. This method is not recommended for sills with protruding ends less than 3 inches. The outside plate in this splice may be made of

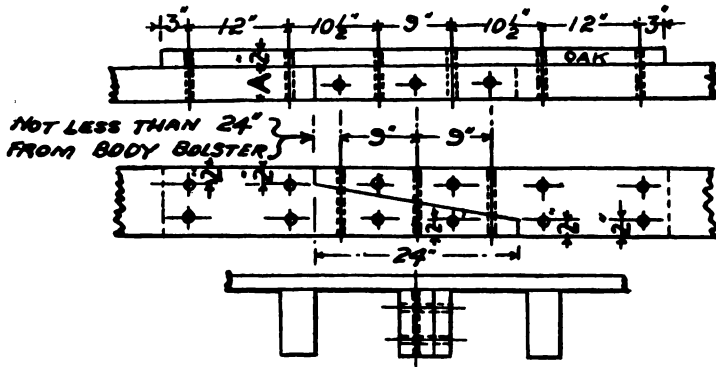


FIG. 9A.

THE SIZE OF HORIZONTAL OR CROSS BOLTS TO BE  $\frac{5}{8}$  INCHES.

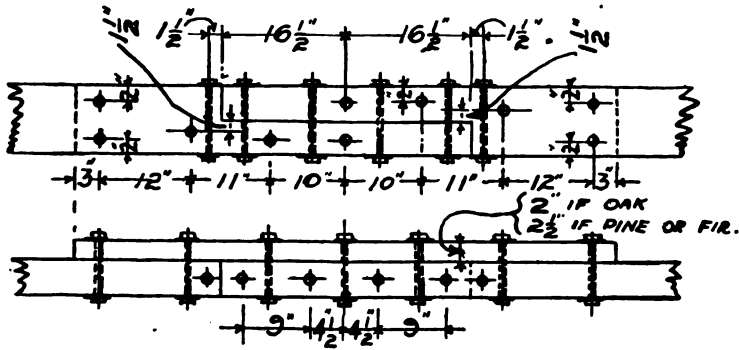


FIG. 9B.

ALL BOLTS  $\frac{5}{8}$ " DIAM.

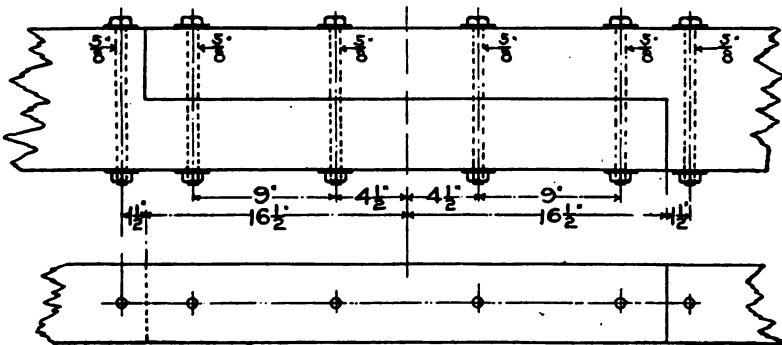
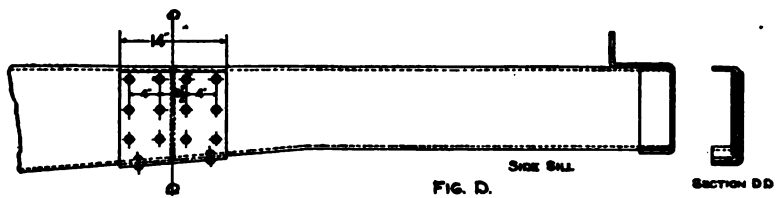
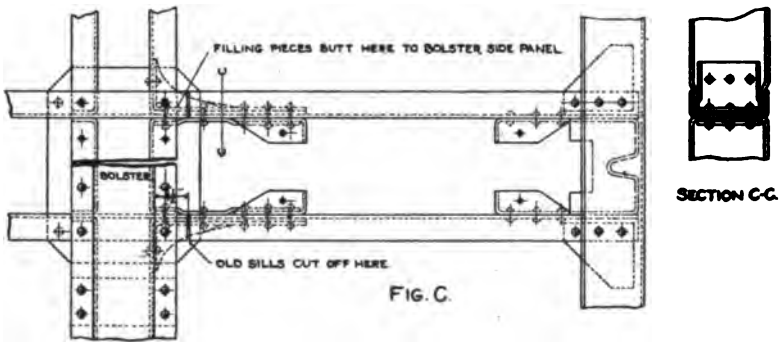
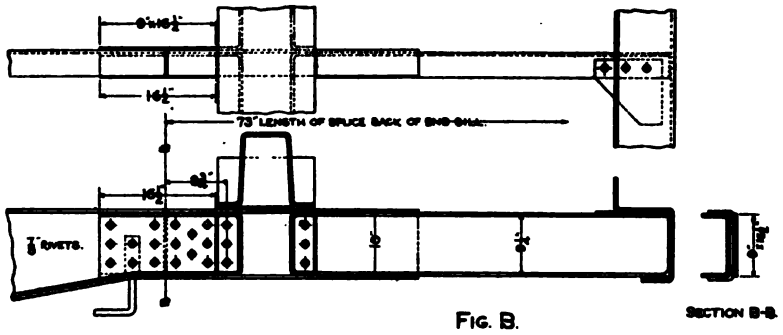
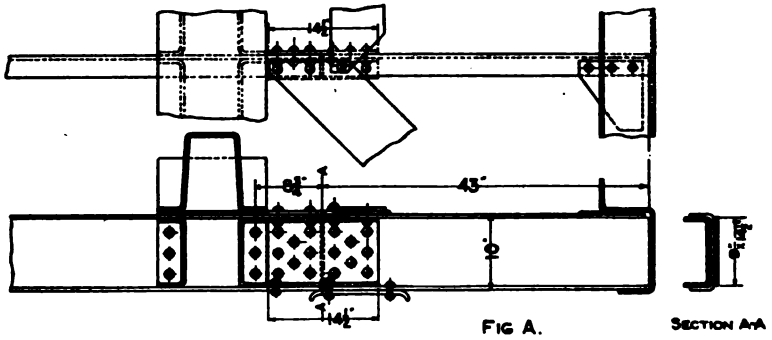


FIG. 9C.



pressed steel or a steel casting. The rivets should be spaced as shown on sketch.

Fig. D shows the method of splicing side sills. This splice may be located on either side of the body bolster. The rivets should be spaced as shown on sketch.

**RULE 23.** In making repairs for which owners are responsible, wheels other than 33-inch may be replaced with 33-inch wheels, if practicable. If changes are necessary in order to bring the car to the proper height, the cost of so doing shall also be chargeable to the car owner.

**RULE 24.** Wheels on the same axle must be of the same circumference.

In no case should two wheels be mounted on the same axle when the thickness of the two flanges together will exceed the thickness of one normal and one maximum flange, or  $2\frac{1}{2}$  inches.

**RULE 25.** New wheels must not be mated with secondhand wheels.

**RULE 26.** Prick punching or shimming the wheel fit must not be allowed.

**RULE 27.** The wheel seats of foreign axles must not be reduced more than  $\frac{1}{8}$  inch to fit the wheels, and in no case must they be reduced below the limits given in Rule 86.

**RULE 28.** Any company repairing foreign cars with wrong material, and not in compliance with the Rules 17 to 27, inclusive, shall be liable to the owners for the cost of changing such car to the original standard, or to the requirements of these rules, except that companies applying axles smaller than the limits given in Rule 86 shall not be held responsible for improper repairs if the car is not stenciled showing the capacity or maximum weight or Limit Weight I or Limit Weight II.

**RULE 29.** When secondhand axles are applied the diameters of the wheel seats and center must not be less than, and the diameter of the journal must be at least  $\frac{1}{8}$  inch greater than the limiting diameters given in Rule 86. If cars are marked with the word "Capacity," the first set of limits must be followed. If cars are marked "Maximum Weight," the second set of limits must be followed. If tank cars are marked Limit Weight I or II, the corresponding limits must be followed.

**RULE 30.** (a) Each new car must be weighed separately and the light weight, capacity in pounds (and cubical capacity, except for flat and tank cars), station symbol and the date (month and year) must be marked thereon at the car works, under the supervision of the owner's inspector. The accuracy

of the scales used must be certified to by a railroad scale inspector appointed by the car owner.

These provisions to be incorporated in the contract covering the purchase of the equipment.

(b) Wooden and steel underframe cars should be re-weighed and re-marked at least once every twelve months during the first two years the car is in service, and thereafter once every twenty-four months. All-steel cars should be re-weighed and re-stenciled at least once every thirty-six months.

A car must be clean when weighed for marking.

The station symbol and the date (month and year) of each re-weighing should be marked the same as provided for new cars in Paragraph (a).

(c) When a car is materially changed by repairs, alterations or repainting, it should be re-weighed and re-marked.

(d) Any car without marking or which has not been re-weighed and re-marked within the prescribed period should be immediately re-weighed and marked. If the car is re-weighed at any time and is found to have a variation of over one per cent between the marked and actual weight, it should be immediately re-marked. When a car is re-marked the car owner should be notified of the old and of the new weights, with place and date. The proper officer to whom these reports should be made will be designated in "The Official Railway Equipment Register."

(e) Whenever a weighmaster at a point not equipped for marking freight cars, as provided in Paragraph (d), ascertains the light weight of a car which is not marked in accordance with this rule, he shall attach to the car the prescribed "Light Weight Card" with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for re-marking the car at first available station.

**RULE 31.** The re-lightweighing of cars, as provided above, to be charged to car owners in accordance with Rule No. 107, except when the weight of the car is changed on account of repairs due to unfair usage; when such repairs are made on authority of defect card, charge for re-lightweighing may be included on same authority.

PARTS OF CARS WHICH JUSTIFY REPAIRS IF OWNERS ARE RESPONSIBLE,  
OR REPAIRS OR CARDING IF DELIVERING COMPANY  
IS RESPONSIBLE.

BODIES.

**RULE 32.** Damage of any kind to the body of the car due to unfair usage, derailment or accident. Defect cards shall not be required for any damage so slight that no repairs are necessary, the receiving line to be the judge.

**RULE 33.** Vacant. October 1, 1913.

**RULE 34.** Vacant. September 1, 1912.

**RULE 30.** Cars equipped with M. C. B. couplers having pocket rear-end attachments and so stenciled, if found with stem or spindle attachments instead of pocket.

After October 1, 1914, cars equipped with couplers having stem or spindle attachments, or American continuous draft rods, will not be accepted in interchange.

After October 1, 1915, cars not having stenciled on them the date when built new, will not be accepted in interchange.

After October 1, 1915, no car carrying products which require for their refrigeration the use of ice and salt will be accepted in interchange unless equipped with suitable device for retaining the brine between icing stations.

Cars built after October 1, 1914, with journal bearings other than M. C. B. Standard, will not be accepted in interchange.

**RULE 36.** Temporary advertisements tacked, glued, pasted or varnished on cars.

The size and character of cards which may be used on freight cars may be divided into four classes, viz.:

1. **Routing Cards:** Cards bearing information required by the railroads, such as initial and number of cars, consignee, consignor, destination, contents, point of shipment, route, etc. These cards may be issued by consignor.

See page 734 for copy of card in reduced form.

2. **Special Cards:** Required by the Regulations for the Transportation of Explosives formulated by the Interstate Commerce Commission and the Regulations for the Transportation of Inflammable Articles and Acids prescribed by the American Railway Association. They shall be used, be of the text and size described, and be attached to cars as prescribed by said regulations.

3. **Symbol (e. g., fast freight line, manifest freight, etc.) and various M. C. B. cards:** Cards prescribed by individual roads for special purposes. Their size, use, text and method of appli-

Delivering  
Company  
responsible.

cation will be prescribed by each individual road to suit its requirements. These cards may only be issued by railroads and may include same information as routing cards except name of consignor.

4. Special Cards: Cards required by United States Customs Regulations or by State authorities, such, for example, as quarantine regulations, and must be used as prescribed by the United States Customs Regulations; also routing cards used by the United States Army for shipment of Quartermaster's supplies. (See page 734.)

COMBINATIONS OF DAMAGES TO CARS WITH WOODEN UNDERFRAMES OR COMPOSITE WOOD AND METAL UNDERFRAMES WHICH DENOTE UNFAIR USAGE, IF EXISTING AT THE SAME END OF CAR AND REQUIRING REPAIRS OR RENEWALS. (Rules 37 to 42, inclusive.)

RULE 37. Damaged coupler body accompanied by damage to draft timber (or its substitute) and end sill.

RULE 38. Vacant. October 1, 1913.

RULE 39. Damaged end sill, accompanied by damage to draft timber (or its substitute) or longitudinal end sill, and damage to coupler body.

RULE 40. Damaged end sill, accompanied by damage to two longitudinal sills.

RULE 41. Damaged longitudinal sills, if necessitating replacement or splicing of more than two sills.

RULE 42. Damaged corner and end posts, if necessitating the renewal of more than three posts. This will include damage to upper structure of cars with metal underframes.

An American continuous draft key and rod shall not enter into a combination of defects denoting unfair usage.

It will be assumed that a missing coupler is damaged unless shown to the contrary. This only refers to cases where the coupler if broken would enter into the combination of defects.

Damage, as used in the above combinations, is understood to mean injury so serious as to render renewal or repairs necessary to the part or parts mentioned.

#### ALL-STEEL UNDERFRAME OR ALL-STEEL CARS.

RULE 43. Any damage to the underframe of all-steel or steel-underframe cars, unless such damage occurred in wreck, derailment, cornering or sidwiping, and except unconcealed fire damage.

Delivering  
company  
responsible.

Owners  
responsible.

RULE 44. Vacant. October 1, 1913.

RULE 45. Vacant. October 1, 1913.

RULE 46. If the car has air-signal or train-line steam pipes, the hose, pipes and couplings are at owner's risk, unless the car is stenciled that it is so equipped.

RULE 47. When two or more cars, chained together, or any cars which require switch chains to handle them, are delivered at an interchange point, the receiving road shall deliver to the delivering road at the time an equivalent number of switch chains of the same size as the chains so used on the cars delivered, or, in lieu thereof, furnish a defect card for such chains.

RULE 48. Failure or loss under fair usage of any part of the body of the car; inside parts or concealed parts at owner's risk.

RULE 49. Steel cars not equipped with cardboards for joint evidence and defect cards.

RULE 50. Vacant. October 1, 1913.

RULE 51. Vacant. October 1, 1913.

RULE 52. Running boards in bad order or insecurely fastened. Bolts, rivets or screws to be used on parts repaired.

Sill steps, ladders, grabirons, bent, broken, missing or insecurely fastened, except when car has been wrecked, cornered or raked.

Handholds or grabirons must be of wrought iron or steel. In applying on repairs they must be secured by bolts or rivets.

On cars stenciled "United States Safety Appliances, Standard," or on cars stenciled "United States Safety Appliances," lag screws must not be used where bolts or rivets are required by law.

Owners  
responsible.

## BRAKES.

RULE 53. All freight cars offered in interchange must be equipped with air brakes having 1¼-inch air-brake pipe and angle cocks; also quick-action triple valve, pressure-retaining valve and an efficient hand brake.

RULE 54. Damage to any part of the brake apparatus caused by unfair usage, derailment or accident that requires repairs or renewal.

RULE 55. Vacant. October 1, 1913.

RULE 56. Cars intended to be equipped with metal brake beams and so stenciled, if found with wooden brake beams.

After October 1, 1915, cars equipped with brake beams other than all metal will not be accepted in interchange.

Delivering  
Company  
responsible.

**RULE 57.** Cars not equipped with M. C. B. Standard  $1\frac{3}{8}$ -inch air-brake hose. For label, see below.

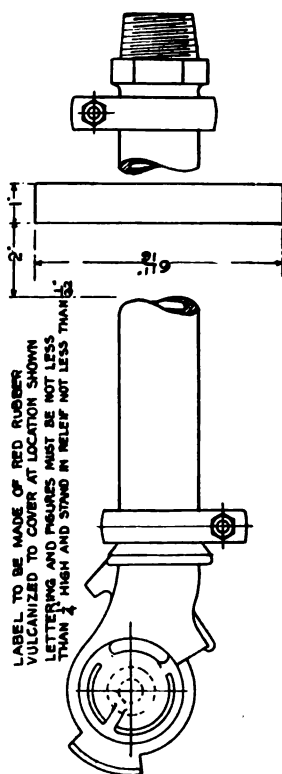
The use of a rectangular label in addition to the band label is optional with any railroad, provided space between the two labels is not closer than 2 inches.

After October 1, 1914, no new hose should be purchased or applied unless it bears the revised band label.

M. C. B. standard hose now in service or in stock will not be penalized.

**RULE 58.** Missing air-brake hose; missing or damaged cylinders, reservoirs, triple valves, angle cocks, cut-out cocks, brake-pipe strainers or dirt collectors, pressure-retaining valves, release valves, pipe, pipe fittings, or any parts of these items, except as specified in Rule 59.

Delivering  
company  
responsible.



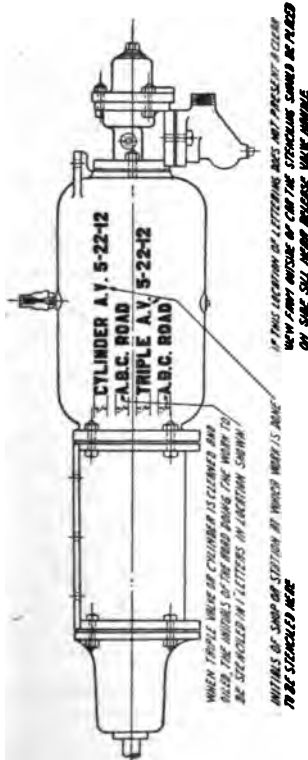
RULE 59. Air hose burst, torn or worn out; air-hose labels illegible or missing from wear; air-hose couplings that have become defective in fair usage; release-valve rods defective or missing; leaky pipe or pipe fittings on account of rust or seams; broken pipe or pipe fittings on account of insecure fastenings; defective interior parts of cylinder or triple valve; failure or loss under fair usage of other parts of brakes.

Owners responsible.

RULE 60. Cylinders or triple valves not cleaned, oiled and tested within twelve months, and the initial of road, together with date of last cleaning, oiling and testing, preferably stenciled on the brake cylinder or auxiliary reservoir, or if same is not readily visible, in a convenient location at release rod, with white paint.

Triple valves cleaned must be tested in accordance with the M. C. B. code of tests for repaired triple valves.

A method of marking brake apparatus which has been cleaned, oiled and tested, is shown herewith. In order to condense the



A B C D E F G H I J K L M N O

P Q R S T U V W X Y Z &

1 2 3 4 5 6 7 8 9 0

stenciling as much as possible, the words "cleaned and oiled" and "tested" have been omitted, as their significance is well known.

RULE 61. Vacant.

RULE 62. In replacing air-brake hose on foreign cars for which bills are made, new M. C. B. 1 $\frac{3}{8}$ -inch Standard hose must be used.

### TRUCKS.

Delivering  
Company  
responsible.

RULE 63. Damage of any kind to the truck due to unfair usage, derailment or accident that requires renewal or repairs.

RULE 64. Vacant. November 1, 1912.

RULE 65. Journal bearings (regardless of previous condition) and journal-box bolts which require renewal, when delivering company is responsible for change in wheels and axles.

RULE 66. Cars built after October 1, 1914, with journal bearings other than M. C. B. Standard will not be accepted in interchange.

Owners  
responsible.

RULE 67. Defective, missing or worn-out parts of trucks not elsewhere provided for, which have failed under fair usage, or if any part of the truck frame or attachments is less than 2 $\frac{1}{2}$  inches above the top of the rail.

### WHEELS.

RULE 68. Flat sliding, cast-iron or cast-steel wheels; if the spot is 2 $\frac{1}{2}$  inches or over in length, or if there are two or more adjoining spots each 2 inches or over in length, the same responsibility to apply to mate wheel, regardless of length of slid spot.

Flat-sliding, steel or steel-tired wheels: if the spot caused by sliding is 2 $\frac{1}{2}$  inches or over in length; a separate defect card to be furnished.

Delivering  
Company  
responsible.

RULE 69. Broken flange, except as in Rule 78, chipped flange, if chip is on throat side of flange, and exceeds 1 $\frac{1}{2}$  inches in length and  $\frac{1}{2}$  inch in width; broken rim, if not caused by defective casting, if the tread, measured from the flange at a point  $\frac{3}{8}$  inch above tread, is less than 3 $\frac{3}{4}$  inches in width (see Fig. 5), or any breakage caused by unfair usage, derailment or accident.

RULE 70. Cars equipped with forged steel or steel-tired wheels and so stenciled, if found with cast-iron or cast-steel wheels.

Cars equipped with cast-steel wheels and so stenciled, if found with cast-iron wheels.

Forged steel wheels may be substituted for cast-steel wheels.

**RULE 71.** Shelled out: wheels with defective treads on account of cracks or shelled-out spots  $2\frac{1}{2}$  inches or over, or so numerous as to endanger the safety of the wheel.

**Brake burn:** wheels having defective treads on account of cracks or shelling out due to heating.

**RULE 72.** Seams  $\frac{1}{2}$  inch long or over at a distance of  $\frac{1}{2}$  inch or less from the throat of the flange, or seams 3 or more inches long, if such seams are within the limits of  $3\frac{3}{4}$  inches, as shown in Fig. 5.

**RULE 73.** Worn through chill: when the worn spot is  $2\frac{1}{2}$  inches or over in length. Care must be taken to distinguish this defect from flat spots caused by sliding wheels.

**RULE 74.** Worn flanges, cast-iron or cast-steel wheels: wheels under cars of less than 80,000 pounds capacity, with flanges having flat vertical surfaces extending 1 inch or more from tread, or flanges 15-16 inch thick or less, gauged at a point  $\frac{3}{8}$  inch above tread. Wheels under cars of 80,000 pounds capacity or over, with flanges having flat vertical surfaces extending  $\frac{7}{8}$  inch or more from tread, or flanges 1 inch thick or less, gauged at a point  $\frac{3}{8}$  inch above tread. (See Figs. 3 and 4.)

**Worn flanges:** forged steel or steel-tired wheels: flanges having flat vertical surfaces extending 1 inch or more from tread, or flanges 15-16 inch thick or less. (See Figs. 3 and 4.)

Owners  
responsible.

**RULE 75.** Thick flange: flange over 1 19-64 inches thick for cast-iron wheels having increased flange and tread standards of 1907 and 1909. (See Fig. 6.)

**RULE 76.** Tread worn hollow: if the tread is worn sufficiently hollow to render the flange or rim liable to breakage.

**RULE 77.** Burst: if the wheel is cracked from the wheel fit, outward, by pressure from the axle.

**RULE 78.** Cracked or broken flange, caused by seams, worn through chill or worn flange. See also Rules 69 and 83.

**RULE 79.** Broken or chipped rim, caused by defective casting, if the tread, measured from the flange at a point  $\frac{5}{8}$  inch above tread, is less than  $3\frac{3}{4}$  inches in width. (See Fig. 5.) See also Rules 69 and 83.

**RULE 80.** Cracked tread, cracked plate, one or more cracked brackets, or broken in pieces under fair usage. See also Rule 69.

**Forged steel or steel-tired wheels loose, broken or cracked hubs, plates, bolts, retaining ring or tire under fair usage.**

**RULE 81.** Wheels loose or out of gauge. (See Fig. 7 for

Owners  
responsible.

wheels cast prior to the M. C. B. Standard tread and flange adopted in 1907, and Fig. 8 for wheels cast after January 1, 1908.)

**RULE 82.** Chipped flange: if chip is on the opposite side from throat of flange and exceeds  $1\frac{1}{2}$  inches in length and  $\frac{1}{2}$  inch in width.

**RULE 83.** The determination of flat spots, worn flanges and chipped treads shall be made by a gauge, as shown in Fig. 1, and its application to defective wheels, as shown in Figs. 2, 3, 4 and 5. The determination of thick flanges for all wheels cast after January 1, 1908, shall be made by a gauge shown in Fig. 6.

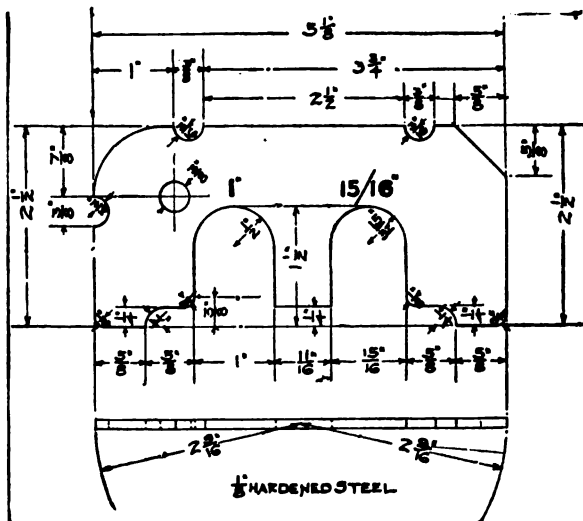
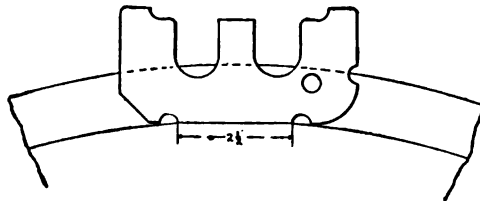


FIG. 1.—Wheel Defect and Worn Coupler Limit Gauge.



METHOD OF GAUGING SHELLED  
AND FLAT SPOTS

FIG. 2.

SEE RULES 68 AND 71.

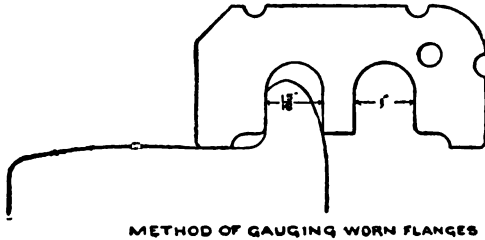
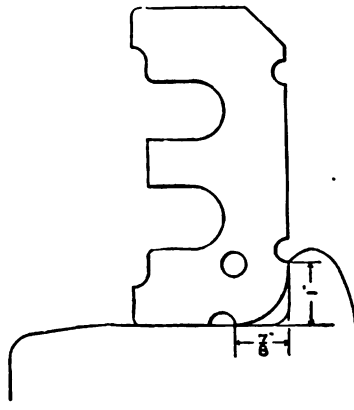


FIG. 3.  
SEE RULE 74.

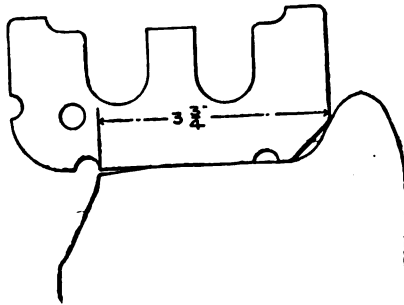
For cast-iron or cast-steel wheels under cars of less than 80,000 pounds capacity, and forged-steel or steel-tired wheels with flanges 15-16 inch thick or less; cast-iron or cast-steel wheels under cars of 80,000 pounds capacity or over, with flanges 1 inch thick or less.



METHOD OF GAUGING WORN FLANGES.

FIG. 4.  
SEE RULE 74.

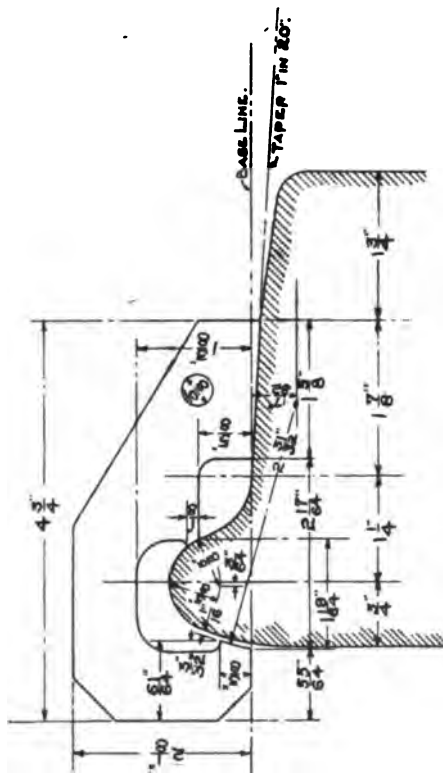
For cast-iron or cast-steel wheels under cars of less than 80,000 pounds capacity, and forged-steel or steel-tired wheels 1 inch or more from tread; for cast-iron or cast-steel wheels under cars of 80,000 pounds capacity or over,  $\frac{3}{8}$  inch or more from tread.



### METHOD OF GAUGING CHIPPED RIMS.

**FIG. 5.**

**SEE RULES 69 AND 79.**



**Fig. 6.**

**For all wheels cast after January 1, 1908.**

**MAXIMUM FLANGE THICKNESS GAUGE.**

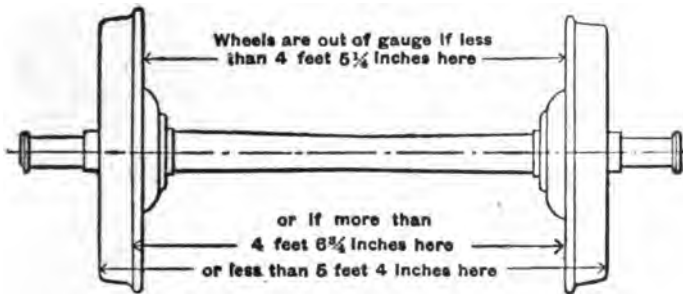


FIG. 7.

*Measurements to be made at the same height on the wheels as the center of the axle.*  
 For wheels cast prior to the M. C. B. Standard tread and flange adopted in 1907.

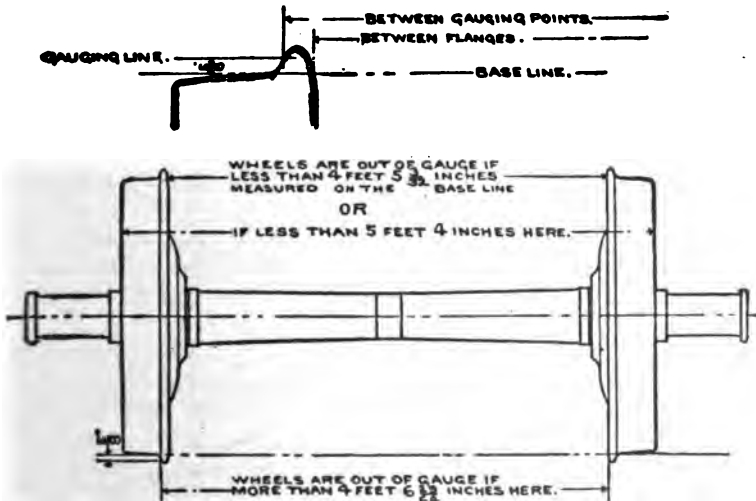


FIG. 8.

*Measurements to be made at the same height on the wheels as the center of the axle.*  
 For wheels cast after January 1, 1908.

## AXLES.

Delivering  
Company  
responsible.

RULE 84. Cut journals, axles bent or axles rendered unsafe by unfair usage, derailment or accident.

RULE 85. Axles broken or having seamy journals, fillets in back shoulder worn out, the length of journal increased  $\frac{1}{2}$  inch over standard length, or collars broken off or worn to  $\frac{1}{4}$  inch or less under fair usage.

RULE 86. Axles less than the following prescribed limits:

## FOR CARS MARKED WITH "CAPACITY."

CAPACITY OF CAR.	JOURNAL.	WHEEL SEAT.	CENTER.
140,000	5½ inches.	7¾ inches.	6½ inches.
100,000	5 "	6¾ "	6½ "
80,000	4½ "	6¼ "	5½ "
70,000	4 "	5½ "	4½ "
60,000	3¾ "	5 "	4½ "
50,000	3½ "	4¾ "	4½ "
40,000	3¼ "	4½ "	3½ "
30,000	3 "	4¼ "	3½ "

## FOR CARS MARKED "MAXIMUM WEIGHT."

MAXIMUM WEIGHT.	JOURNAL.	WHEEL SEAT.	CENTER.
210,000	5½ inches.	7¾ inches.	6½ inches.
161,000	5 "	6¾ "	5½ "
132,000	4½ "	6¼ "	5½ "
112,000	4¼ "	6 "	5¼ "
95,000	3¾ "	5½ "	4¾ "
79,000	3½ "	5¼ "	4¾ "
66,000	3¼ "	4¾ "	4¾ "
58,000	3 "	4¼ "	4¾ "

Owners  
responsible.

TABLE I.

## FOR TANK CARS MARKED LIMIT WEIGHT I.

LIMIT WEIGHT I. IN POUNDS	JOURNAL.	WHEEL SEAT	CENTER.
210,000	5½ inches.	7¾ inches.	6½ inches.
161,000	5 "	6¾ "	5½ "
132,000	4½ "	6¼ "	5½ "
112,000	4 "	5½ "	4½ "
95,000	3¾ "	5 "	4¾ "
79,000	3½ "	4¾ "	4¾ "
66,000	3¼ "	4½ "	3½ "
58,000	3 "	4¼ "	3½ "

TABLE II.

## FOR TANK CARS MARKED LIMIT WEIGHT II.

LIMIT WEIGHT II IN POUNDS.	JOURNAL.	WHEEL SEAT.	CENTER
210,000	5½ inches.	7¾ inches.	6½ inches.
161,000	5 "	6¾ "	5½ "
132,000	4½ "	6¼ "	5½ "
112,000	4¼ "	6 "	5¼ "
95,000	3¾ "	5½ "	4¾ "
79,000	3½ "	5¼ "	4¾ "
66,000	3¼ "	4¾ "	4¾ "
58,000	3 "	4¼ "	4¾ "

All cars, except tank cars, to have their light weight and capacity or their light weight and maximum weight stenciled on them.

Owners  
responsible.

All tank cars to have Limit Weight I or Limit Weight II stenciled on them.

### IMPROPER REPAIRS.

**RULE 87.** Any company making improper repairs is solely responsible to the owners, with the exception of the cases provided for in Rules 35, 56, 57 and 70.

**RULE 88.** The company making such improper repairs shall place upon the car, at the time and place the work is done, an M. C. B. defect card, which card must state the wrong material used.

Company  
making repairs  
responsible.

**RULE 89.** Vacant. October 1, 1913.

**RULE 90.** If an intermediate road finds it necessary for safety to standardize wrong repairs, it may render bill against the car owner for the expense, except as provided in Rules 35, 56, 57 and 70. The billing repair card of such intermediate line shall be final as to the fact that such wrong repairs existed and shall perform the same function as a joint evidence card.

### INSTRUCTIONS FOR BILLING.

**RULE 91.** Bills may be rendered for work done under Rule 16, except in cases where owners are not responsible and the car bears no defect card covering the defects repaired, stating upon the bill the date and place where the repairs were made; the billing repair card or defect card to accompany the bill.

**NOTE.**—The following rules of the Association of American Railway Accounting Officers should be observed when rendering or correcting bills:

(a) Bills should not be rendered for amounts less than 25 cents in aggregate, but charges for items less than 25 cents may be held until they amount to that sum, provided said aggregate is rendered within 60 days.

(b) No bills should be returned for correction on account of incorrect car numbers, but shall be passed for payment at once and the alleged errors in car numbers brought to the attention of the company rendering same, within 60 days from date of receipt of bill.

The billing company shall furnish correct car reference, or shall issue within 30 days countercharge authority as per form shown on page 728.

(c) No bills shall be returned for correction on account of

other error or questionable charges unless the net amount involved exceeds 10 per cent of the total amount of bill, but shall be passed for payment at once and the alleged error brought to the attention of the billing company within 60 days from date of receipt of bill. The billing road must furnish proper explanation or shall issue within 30 days countercharge authority on form shown on page 728.

(d) Undercharges shall be similarly adjusted on regular authority of the company against which the bill has been rendered.

(e) When bills are returned for correction, all defect cards and billing repair cards, except those in question, must be retained by the company against which the bill has been rendered.

**RULE 92.** In rendering bills, cars shall be treated as belonging to companies or individuals whose name or initials they bear, except in case of Line Cars where the equipment list of the general officers of the Line designates a party to make settlement.

**RULE 93.** Separate bills must be rendered for cars destroyed.

All charges for repairs made to cars on account of owner's defects, defect cards and rebuttal authorities must be consolidated against any one company into one bill.

Separate statements to be made:

First. For owner's defects for each calendar month.

Second. For all charges based on defect cards, including rebuttal charges.

**NOTE.**—Totals only of these statements to be shown on the recapitulation.

**RULE 94.** For repairs made on defect cards, the card must accompany the bill as voucher for the work done, but no bill shall be rendered for repairs which have not been made.

**RULE 95.** Bills may be rendered against car owners for the labor only of replacing the following material when lost on the line of the company making the repairs, viz.:

Brake beams, including shoes, heads, jaws and hangers, when lost with the brake beams.

Brake levers, lever guides, top and bottom brake rods, whether or not they are lost with the brake beam.

Couplers, including yokes, springs and followers, when lost with the coupler.

**RULE 96.** In making bills under these rules, the information necessary should be embodied on the forms shown on page 731. whether the same is made as a bill or a statement to accompany a bill.

In exchanging wheels and axles under foreign cars, reports on billing repair cards, of M. C. B. Standard size, embodying all information required by the statement shown on page 731, will be accepted.

**RULE 97.** Bills or statements for wheel and axle work must make specific mention of each wheel and axle removed and applied. If no marks are found on wheels or axles removed a notation to that effect must be made.

**RULE 98.** Bills rendered for wheels and axles shall be in accordance with the following schedule of prices for material, with the proper debits and credits:

	New.	Average Credit Price.	
One 36-inch cast-iron wheel.....	\$10.50	\$5.25	
One 33-inch cast-iron wheel.....	9.00	4.75	
One 33-inch cast-steel wheel.....	19.50	4.75	
	New.	SECOND-HAND.	SCRAP.
One 33-in. forged or rolled steel wheel .....	\$19.50	.....	\$4.50
One axle, 140,000 pounds.....	25.50	\$15.25	9.00
One axle, 100,000 lbs.....	19.50	11.75	6.75
One axle, 80,000 lbs.....	16.50	10.00	5.75
One axle, 60,000 lbs.....	13.00	7.75	4.50
One axle, 50,000 lbs. (or under) ..	10.00	5.00	3.50
And with an additional charge for all labor for each pair of wheels and axles removed from all types of trucks.....	2.25	.....	.....
Removing, turning and replacing a pair of forged or rolled steel or steel-tired wheels, for all types of trucks.....	3.25	.....	.....

If new wheels and axles are substituted for secondhand wheels and axles, proper charges and credits shall be allowed, although such substitution be made on account of only one loose or defective wheel, or a defective axle, with the following exceptions: In case the owner of a car removes a damaged wheel or axle, no charge shall be made for any difference in value between the parts used and those removed that are not damaged.

The price for new forged or rolled steel wheels shall only apply to such wheels having treads  $1\frac{3}{8}$  inches thick or over, measured from base line of tread to the condemning limit, which is  $\frac{1}{4}$  inch above witness groove. For wheels having treads less than  $1\frac{3}{8}$  inches thick as described, a reduction shall be made in price at the rate of 75 cents per  $\frac{1}{16}$  inch thickness (on radius) of tread.

Any loss or increase of service metal on forged or rolled steel wheels shall be credited or charged at the rate of 75 cents per  $1\text{-}16$  inch thickness (on radius) of tread.

#### IN CASE OF OWNER'S DEFECTS.

No credit will be allowed owner for loss of service metal due to turning-off wheels. Should there be a further loss of service metal, however, due to the application of other wheels, the proper credit for such additional loss must be given the owner. Any increase in the amount of service metal, due to the application of other wheels, may be charged to the owner.

#### DELIVERING LINE DEFECTS.

When repairs are not covered by a defect card, the proper credit for any loss of service metal must be given the owner; but no charge shall be made against the owner for any increase in the amount of service metal, due to application of other wheels.

#### DELIVERING LINE DEFECTS.

When the repairs are covered by the defect card of another company, charge covering such repairs shall be made against the owner of the car, the defect card and the billing repair card to be attached to the bill. The owner to render counter-bill on the authority of the defect card against the company issuing same, including an additional charge to cover the loss of service metal, on account of the defects covered by the card. Should there be an additional loss of service metal, on account of the application of other wheels, the company making the repairs shall allow the proper credit to the owner to cover such additional loss of metal. Should there be an increase in the amount of service metal, due to the application of other wheels, such increase may be charged to the owner and included in the owner's counter-bill against the company issuing the defect card, except when repairs are made by the owner.

The above provisions shall govern any loss or increase of service metal on account of the mate wheel, even if same is not defective, when both wheels are turned off to correspond.

The necessary information must be given in all cases, as provided in Rule 10.

In cases of slid-flat wheels,  $\frac{1}{8}$  inch for loss of service metal will be allowed for flat spots  $2\frac{1}{2}$  inches long and 1-16 inch for each additional inch or fraction thereof.

**RULE 99.** If car owner elects, on account of improper repairs, to remove M. C. B. standard axles suitable to the marking of the car, he shall make charge for secondhand axles, and allow credit for secondhand axles if they are in good order. If M. C. B. standard axles unsuitable to the marking of the car are removed, they should be credited as scrap regardless of their condition. Axles removed below the journal limits for cars marked capacity, limit weight, or maximum weight, as per Rule 86, should be credited as scrap when removed.

**RULE 100.** Bills or statements which do not embody all the information called for by the headings of the columns may be declined until made to conform to the requirements of the rule.

**RULE 101.** Bills for repairs made under these rules and for material furnished shall be in conformity with schedule of prices and credits for the articles enumerated below:

MATERIAL.	8-inch.	10-inch.
<b>Air-brake Equipment:</b>		
Air-brake hose, $1\frac{1}{4}$ -inch M. C. B. standard, complete with fittings, applied to car, charge	\$2.00	\$2.00
Air-brake hose, M. C. B. standard, credit for fittings for same.	.80	.80
Angle cock, plain handle	1.50	1.50
Angle cock, self-locking handle	1.80	1.80
Angle cock handle, plain	.08	.08
Angle cock handle, self-locking, complete	.40	.40
Angle cock handle, self-locking	.25	.25
Auxiliary reservoir, detachable type	2.75	6.25
Auxiliary reservoir, combined type	2.75	6.25
Brake pipe air strainer, $1\frac{1}{4}$ -inch	.60	.60
Brake pipe air strainer union nut	.12	.12
Brake pipe strainer union nut swivel	.12	.12
Centrifugal dust collector, 1-inch	1.20	1.20
Centrifugal dust collector, $1\frac{1}{4}$ -inch	1.50	1.50
Centrifugal dust collector deflector and plug	.30	.30
Check valve cap	.25	.25
Cut-out cock	1.30	1.30
Cut-out cock handle	.07	.07
Cylinder body	2.00	3.50
Cylinder piston and rod	1.00	1.50
Cylinder piston follower	.08	.25
Cylinder piston packing leather	.60	1.00
Cylinder piston packing leather expander	.06	.06
Cylinder piston release spring	.50	.50
Cylinder non-pressure head	.60	1.25
Cylinder pressure head, plain	.50	.75
Cylinder pressure head with lever brackets, lugs and bolts	1.50	1.75
Cylinder gasket	.06	.08
Exhaust piston	.20	.20
Exhaust piston head	.40	.40
Exhaust piston seat	.10	.10
Gasket, air hose coupling	.04	.04
Gasket, leather, union, all sizes	.04	.04

MATERIAL.	8-inch.	10-inch.
Pipe nipple on end of train line.....	\$0.12	\$0.12
Piston stop.....	.10	.10
Pressure-retaining valve, 2 position.....	1.00	1.00
Pressure-retaining valve, 3 position.....	3.00	3.00
Release valve.....	.60	.60
Release valve handle.....	.10	.10
Release valve rubber seat.....	.02	.02
Release valve vent valve, complete.....	.10	.10
Release rod.....	.10	.10
Retaining valve handle.....	.06	.06
Retaining valve cock key, 2 position.....	.15	.15
Retaining valve cock key, 3 position.....	.20	.20
Retaining valve case, 2 position.....	.10	.10
Retaining valve case, 3 position.....	.40	.40
Retaining valve spring.....	.03	.03
Retarding device body.....	.80	.80
Retarding device screws (each).....	.04	.04
Retarding device stem.....	.50	.50
Retarding device spring.....	.06	.06
Rubber seat, for triple emergency valve, check valve or vent valve.....	.05	.05
Side cap.....	.20	.20
Train pipe air strainer (1¼-inch).....	.60	.60
Triple check-valve case.....	1.00	1.00
Triple cylinder cap (drain cup).....	.75	.75
Triple cylinder front cap, type K-3, 4, 5, 6, N. Y.....	.75	.75
Triple cylinder front cap, type F and H-N. Y.....	.60	.60
Triple cylinder or main cylinder gasket.....	.40	.40
Triple emergency valve, all classes.....	.60	.60
Triple emergency valve seat.....	.55	.55
Triple emergency valve piston.....	.50	.50
Triple emergency valve piston ring only.....	.15	.15
Triple emergency check valve, metal.....	.25	.25
Triple emergency check valve spring.....	.02	.02
Triple emergency check case gasket.....	.10	.10
Triple graduating spring.....	.05	.05
Triple graduating stem.....	.15	.15
Triple graduating stem nut.....	.20	.20
Triple graduating valve, round type.....	.06	.06
Triple graduating valve, flat type.....	.25	.25
Triple graduating valve spring.....	.02	.02
Triple piston and ring.....	2.00	2.00
Triple piston K type.....	3.00	3.00
Triple piston ring (only).....	.25	.25
Triple slide valve, old type, W. A. B. Co.....	.75	.75
Triple slide valve, F-1, N. Y.....	.75	.75
Triple slide valve, H-1, N. Y.....	.90	.90
Triple slide valve, K type.....	1.50	1.50
Triple slide valve spring.....	.03	.03
Triple union nut.....	.10	.10
Triple union swivel.....	.10	.10
Triple valve body, complete, old style W. A. B.....	5.50	5.50
Triple valve body, complete, old style N. Y.....	6.00	6.00
Triple valve body, K type.....	8.00	8.00
Triple valve seat, metal.....	1.50	1.50
Triple valve strainer.....	.05	.05
Triple valve gasket.....	.20	.20
Triple vent piston.....	.70	.70

MATERIAL.	Charge.	Credit.
Altering height of one end of car, by adjusting center plates or body bolster, net.....	\$1.40	.....
Altering height of one end of car, shimming springs, net (this includes renewing of shims).....	.60	.....
Bolts, nuts and forgings, finished, per lb.....	.03	\$0.005
Brake shoe applied; no credit for scrap.....	.36	.....
Brake shoe, reinforced back, applied; no credit for scrap.....	.42	.....
Brake shoe key applied; no credit for scrap.....	.04	.....

MATERIAL.	Charge.	Credit.
Castings, rough iron, per lb.....	\$0.02	\$0.005
Castings, rough malleable, per lb.....	.04	.005
Castings, rough steel, per lb.....	.055	.005
Chain, per lb.....	.04	.005
Coupler, M. C. B., complete, new, steel 5" by 5" shank.....	9.00	
Coupler, M. C. B., Temporary Standard, complete, new, steel 5" by 5" shank.....	10.50	
Coupler, M. C. B., complete, new, steel 5" by 7" shank.....	9.50	
Coupler, M. C. B., Temporary Standard, complete, new, steel 5" by 7" shank.....	11.00	
Coupler body, M. C. B., one, new, steel 5" by 5" shank.....	5.90	1.10
Coupler body, M. C. B., Temporary Standard one, new, steel, 5" by 5" shank.....	7.40	1.25
Coupler body, one, malleable 5" by 5" shank.....		1.10
Coupler body, M. C. B., one, new steel 5" by 7" shank.....	6.40	1.20
Coupler body, M. C. B., Temporary Standard, one, new, steel, 5" by 7" shank.....	7.90	1.35
Coupler body, one, malleable 5" by 7" shank.....		1.20
Coupler knuckle, one, new, open.....		.40
Coupler knuckle, one, new, solid.....	2.25	.40
Coupler knuckle pin, one, new.....	.25	.05
Coupler lock, one, new.....	.60	.06
Coupler release clevis, applied, net.....	.06	
Coupler release clevis link, applied, net.....	.06	
Other individual malleable, wrought or steel parts, per lb.....	.04	
Door, for end of box or stock car, wooden, each, applied; no credit for scrap.....	2.00	
Door, for end of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap.....	3.50	
Door, for side of box or stock car, wooden, each, applied; no credit for scrap.....	5.25	
Door, for side of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap.....	7.25	
Door, for side of carriage, automobile, or furniture car, wooden, each, applied; no credit for scrap.....	6.00	
Door, for side of stock car, with iron rods, each, applied; no credit for scrap.....	7.00	
Door, for roof of coke car, wooden, each, applied; no credit for scrap.....	1.50	
Door, for roof of stock car, wooden, each, applied; no credit for scrap.....	1.50	
Half door, for side of box or stock car, each, applied; no credit for scrap.....	3.25	
Half door, for end of furniture, carriage or automobile car, each, applied; no credit for scrap.....	6.00	
Handhold, one, applied, net.....	.40	
Hatch cover, for roof of refrigerator car, wooden, each, applied; no credit for scrap.....	1.75	
Hatch plug, for refrigerator car, wooden, each, applied; no credit for scrap.....	2.00	
Iron, galvanized, per lb.....	.0425	
Journal bearings, brass or bronze, lined or unlined, per lb., applied.....	.18	.13
Journal bearings, filled brass or bronze shell, per lb., applied.....	.14	.10
Journal bearings; weights to be charged and credited as follows:	Lbs.	Lbs.
For journals 7 inches long and over, but not 8 inches.....	10	6
For journals 8 inches long and over, but not 9 inches.....	13	8
For journals 9 inches long and over, but not 10 inches.....	20	12
For journals 10 inches long and over, but not 11 inches.....	25	15
For journals 11 inches long and over.....	37	23
Journal bearings, cast steel, or malleable iron back, credit for scrap, per lb.....		.02
Key ring, one, applied; net.....	.05	
Labor, per hour.....	.28	
Lumber—Yellow, White and Norway Pine, Poplar, Oak, Hickory and Elm, dressed and framed, per foot B.-M. required to make the part.....	.04	
Nails, per lb.....	.03	
Nut-lock, one, applied; net.....	.03	
Paint, lead, freight car, mixed, per lb.....	.15	
Paint, mineral, freight car, mixed, per lb.....	.07	
Pipe, 3/4-inch, per ft.....	.03	
Pipe, 1-inch, per ft.....	.05	
Pipe, 1 1/4-inch, per ft.....	.07	
Ratchet wheel key, one, applied; net.....	.05	
Spring cotter or split keys, separately or in connection with other repairs, each, applied.....	.03	
Steel for springs, rough, per lb.....	.03	.005
Steel helical springs, per lb.....	.035	.005
Steel, pressed and flanged, per lb.....	.035	.005
Steel, plate and structural, per lb.....	.025	.005
Stenciling sides and ends when done to preserve identity of car, when not necessitated by other repairs, net (per Rule 102).....	.60	

**RULE 102.** Not more than one pound of mineral paint can be charged for 15 square feet of surface covered, and not more than one pound of lead paint for 12 square feet of surface covered. No charge to be made for lettering except when done to preserve the identity of the car and not necessitated by other repairs.

**RULE 103.** Whenever scrap credits are allowable the weights of scrap credited shall be equal to the weights of the new metal applied, except as otherwise provided in the rules, and except in the case of scrap M. C. B. couplers, and parts of same, and material applied on defect cards, in which cases the weight and kind of metal removed shall be credited.

**RULE 104.** Secondhand M. C. B. couplers or parts, or secondhand metal brake beams may be used in repairs, but must be charged at 75 per cent of value new.

Secondhand M. C. B. couplers or parts removed, must be credited at 75 per cent of value new. Credits shall be confined to the body, lock, knuckle and knuckle pin, whether secondhand or scrap.

Secondhand parts of metal brake beams removed must be credited at 50 per cent of value new.

In applying new M. C. B. coupler or new metal brake beam it shall be so charged, whether or not it be of same make as that removed.

**RULE 105.** Manufactured articles not included in Rules 98 and 101 must be charged at current market prices.

**RULE 106.** No percentage to be added to either material or labor.

**RULE 107.** The following table shows the number of hours which may be charged for labor in doing the various items of work necessary to complete each item of work enumerated, which includes all work necessary to complete each item of repairs, except in so far as labor is already included in charges for material:

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Advertisements, temporary, tacked on car, removing, per car.....		\$0.50		\$0.50
Advertisements, temporary, pasted, glued or varnished on cars, removing, per car.....		1.00		1.00
Air-brake equaliser or fulcrum, one, renewed.....	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Air-brake block or plate (plus labor charge for R. and R. cylinder when necessary to do so), one, renewed.....	2	.56	2	.56
American continuous draft rods, one rod, welding.....	$2\frac{1}{2}$	.70	$2\frac{1}{2}$	.70
Anchor rod (bolster and deadwood), one, renewed.....	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Anchor rod (bolster and deadwood), blacksmith labor repairing.....	1	.28	1	.28

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Anchor rod, head block tank car or Gould draft, one, renewed.	1	\$0.28	1	\$0.28
Anchor, rod, head block tank car or Gould draft, blacksmith labor, repairing.	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Anchor tank band, one, renewed.	1	.28		
Anchor tank band, blacksmith labor, repairing.	1	.28		
Anchor tank band "Y" bolt, one, renewed.	$\frac{1}{2}$	.14		
Anchor tank band "Y" bolt, blacksmith labor, repairing.	$\frac{3}{4}$	.21		
Anchor or lug straps, one, renewed.	1	.28	1	.28
Anchor or lug straps, blacksmith labor, repairing.	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Arch bars, 1 or 2 replaced on same side of truck.	$3\frac{1}{2}$	.98	$3\frac{1}{2}$	.98
Arch bars, blacksmith labor, each, repairing.	$2\frac{1}{2}$	.70	$2\frac{1}{2}$	.70
Arch bar, drawing down.	1	.28	1	.28
Arch bar tie straps, one, renewed.	1	.28	1	.28
Arch bar tie straps, blacksmith labor, one, repairing.	1	.28	1	.28
Belt rail or girth (end), when two posts or braces are renewed	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Belt rail or girth (end), when not associated with renewal of posts or braces.	3	.84	4	1.12
Belt rail plank (end) when renewed separately.	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Belt rail plank (side), when renewed separately.	2	.56	2	.56
Bolster, body, composite, one, replaced.	12	3.36	15	4.20
Bolster, body, metal, one, replaced.	$9\frac{1}{2}$	2.66	$9\frac{1}{2}$	2.66
Bolster, body, wood, one, replaced.	$9\frac{1}{2}$	2.66	12	3.36
Bolster, body, metal, one replaced when draft timbers extend through same.	15	4.20	17	4.76
Bolster, body, plain metal or wood, one, replaced when one or more defective sills are replaced.	$2\frac{1}{2}$	.70	$2\frac{1}{2}$	.70
Bolster, composite, one, replaced when one or more defective sills are replaced.	3	.84	3	.84
Bolster, truck, one, replaced.	9	2.52	9	2.52
Bolster, truck, one, and one spring plank in same truck, replaced.	13	3.64	13	3.64
Body truss rod bearing or queen post, closed, one, renewed	1	.28	1	.28
Body truss rod bearing or queen post, closed, two on same rod, renewed.	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Body truss rod bearing or saddle block, open, one, renewed	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Body truss rod washer, renewed.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Body truss rod, full length, renewed.	$2\frac{1}{2}$	.70	$3\frac{1}{2}$	1.05
Body truss rod, per section, renewed.	$1\frac{1}{2}$	.49	3	.84
Body truss rod, per section, or full length, blacksmith labor, repairing.	$1\frac{1}{4}$	.35	$1\frac{1}{4}$	.35
Body truss rod, tightening and replacing on saddle.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Braces, side or end, one, renewed.	$4\frac{1}{2}$	1.26	$6\frac{1}{2}$	1.82
Braces, side or end, each, renewed, when associated with the renewal of posts.	$2\frac{1}{2}$	.77	$4\frac{1}{2}$	1.33
Brake beam, one, replaced, including attachments and connections.	2	.56	2	.56
Brake beam, metal, one, blacksmith labor, repairing.	2	.56	2	.56
Brake beam, wooden truss, repairing.	$1\frac{1}{4}$	.35	$1\frac{1}{4}$	.35
Brake beam guide or finger guard, one, renewed.	$\frac{1}{2}$	.07	$\frac{1}{2}$	.07
Brake beam head (wooden beam), one, renewed.	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Brake beam head (wooden beam), two on same beam, renewed.	1	.28	1	.28
Brake beam safety chain, separately, one, renewed.	$\frac{1}{2}$	.07	$\frac{1}{2}$	.07
Brake beam suspension spring hanger or link, one, renewed	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake beam hook bolt, one, renewed.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake chain, one, renewed.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake connection rod or lever, one or both applied.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake connection repaired and replaced.	1	.28	1	.28
Brake hanger, repaired and replaced.	1	.28	1	.28
Brake hanger, separately, one, renewed.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake hanger shackle box or bearing and cap, one, renewed	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Brake hanger trimmer block, one, renewed.	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Brake hanger eye bolt, separately, one, renewed.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake lever guide or carrier, one, renewed.	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake lever bracket, one, renewed.	$\frac{1}{2}$	.21	$\frac{1}{2}$	.21
Brake pawl, one, renewed.	$\frac{1}{2}$	.07	$\frac{1}{2}$	.07
Brake pin or key bolt, separately, one, renewed.	$\frac{1}{2}$	.07	$\frac{1}{2}$	.07
Brake rod carrier, one, renewed.	$\frac{1}{2}$	.07	$\frac{1}{2}$	.07

LABOR.	ORDINARY CARS.		REFRIGERATOR CAR.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor
Brake shaft, one, renewed.....	1	\$0.28	1	\$0.28
Brake shaft, blacksmith labor, repairing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake shaft brace or support, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake shaft brace or support, blacksmith labor, repairing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake shaft carrier or bow, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake shaft carrier or bow, blacksmith labor, repairing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake shaft step board plate, only, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake shoe, applied on authority of defect card when brake beam is not replaced.....	1	.28	1	.28
Brake step board, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Brake wheel, one, renewed.....	2	.56	2	.56
Buffer block, one, cast-iron, replacing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Buffer block, one, cast-iron, replacing.....	1	.28	1	.28
Bolts—				
Carrier iron bolts, 6-inch or less, each.....	$\frac{1}{4}$	.07	$\frac{1}{4}$	.07
Carrier iron bolts or draft timber bolts, over 6 inches long, either or both, replacing at same end of car.				
5 or less each.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
6 or more, all.....	3	.84	3	.84
Center plate bolts, one or more, or all at one end, replacing.....	3	.84	3	.84
Center plate bolts and center plate, at one end, replacing.....	3	.84	3	.84
NOTE.—If center plate bolts pass through draft timbers they shall be termed center plate bolt and charged accordingly.				
Coupler stop bolts, lug strap bolts or draft timber cross-tie bolts, at same end of car, when coupler is not removed.				
5 or less, each.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
6 or more, all.....	3	.84	3	.84
Draft timber bolts or carrier iron bolts, over 6 inches long, either or both, at same end of car, replacing.....				
5 or less, each.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
6 or more, all.....	3	.84	3	.84
Journal box bolts or column bolts, in same truck, one, replaced.....	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Each additional, replaced.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Bolts, 6 inches or less in length, other than those provided for, each, applied.....	$\frac{1}{4}$	.07	$\frac{1}{4}$	.07
Bolts, over 6 inches in length, other than those provided for, each, applied.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Card board, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Carline, one, renewed.....	4	1.12		
Carrier iron, one, renewed.....	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Carrier iron, blacksmith labor, repairing.....	$\frac{3}{4}$	.21	$\frac{3}{4}$	.21
Carrier iron, one, tightening.....	$\frac{1}{4}$	.07	$\frac{1}{4}$	.07
Chute plank, top, middle or bottom, side, each, renewed.....	$1\frac{1}{2}$	.42		
Chute plank, end, each, renewed.....	1	.28		
Column casting, one or both, replaced on same end of truck.....	3	.84	3	.84
Column casting, two, replaced on opposite sides same truck.....	$5\frac{1}{2}$	1.54	$5\frac{1}{2}$	1.54
Column casting, when arch bar is off, one or two, applied.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Column guide, one, renewed.....	1	.28	1	.28
Column guide, two at same end of bolster, renewed.....	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Center pin (head), applied.....	1	.28	1	.28
Center pin (head), applied, and placing car on center.....	2	.56	2	.56
Center pin (key) applied, including placing car on center, if necessary.....	2	.56	2	.56
Center plates, one or two, at same end, replacing.....	$2\frac{1}{2}$	.70	$2\frac{1}{2}$	.70
Corner band, one, replaced.....	1	.28	1	.28
Coupler, with stem attachments, coupler springs, one or more follower plates, American continuous draft key, American continuous draft rods, one or more coupler stops, renewing or replacing one or all, at same end of car, at same time.....	$3\frac{1}{2}$	.98	$3\frac{1}{2}$	.98
Coupler, with pocket attachments, coupler springs, one or more follower plates, one or more coupler stops, coupler stop bolts, coupler pocket, coupler pocket rivets, renewing or replacing any or all, at same end of car, at same time.....	5	1.40	5	1.40
(This does not include coupler stops riveted, which should be charged for on a per rivet basis in addition to the				

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
cost of removing and replacing when it is necessary to do the riveting.)				
Coupler with key attachments, renewing or replacing.....	2	\$0.56	2	\$0.56
Coupler cross key renewed or replaced alone.....	1	.28	1	.28
Coupler yoke bolts, applied, one or two, at same end of car (coupler not R. & R.).....	1	.28	1	.28
Coupler yoke, blacksmith labor, repairing.....	1½	.42	1½	.42
Coke rack cleat (wooden rack), each renewed.....	¾	.21		
Coke rack gate (2 bars), renewed.....	1	.28		
Coke rack gate (3 bars), renewed.....	1½	.35		
Coke rack gate guide, each, renewed.....	¾	.21		
Coke rack gate slat, each, renewed.....	¾	.21		
Coke rack stake clamp, each, renewed.....	½	.14		
Coke rack stake clip, each, renewed.....	¼	.07		
Coke rack thimble or catch, each, renewed.....	¼	.07		
Cross-tie timber, one, replaced.....	6	1.68	7	1.96
Cross-tie timber, one, replaced when one or more defective sills are replaced.....	1½	.42	2	5.6
Dead block, wooden, replacing at one end of car.....	3½	.98	3½	.98
Dead block, metal, renewed at one end of car.....	2½	.70	2½	.70
Deck bearer upper (stock car), one, renewed.....	1	.28		
Deck, upper, flooring, per board, renewed.....	½	.14		
Door, end, old, rehanging.....	1	.28		
Door, side, old, rehanging.....	2	.56	3	.84
Door bar (stock car), renewed.....	1	.88		
Door batten or stile (nailed door), not including R. & R. door, renewed.....	1	.28	1	.28
Door rail or stile (frame door), not including R. & R. door, renewed.....	2	.56	2	.56
Door cap or housing (wood), renewed.....	2	.56	2	.56
Door cap or housing (metal), renewed.....	2	.56	2	.55
Door hanger or roller, either or both, renewed.....	1	.28		
Door hinge, one, renewed.....	1	.28	1	.28
Door guide bracket, one, renewed.....	1	.28		
Door guide rail bracket, one, renewed.....	¾	.07		
Door hasp or keeper, one or both, renewed.....	½	.14		
Door seal hook and chain, one, renewed.....	¾	.14	¾	.07
Door stop, iron, one, renewed.....	¾	.14		
Door stop, wood, one, renewed.....	1½	.42		
Door rod (lock), one, renewed.....	1½	.42		
Door rod (lock), blacksmith labor, repairing.....	1	.28		
Door rod bearing, only, one, renewed.....	½	.14		
Door rod shoe, only, one, renewed.....	½	.14		
Door track, top or bottom, one, renewed.....	2	.56		
Door track, top or bottom, blacksmith labor, repairing.....	1	.28		
Door track, repaired on car.....	¾	.21		
Draft timbers, one, replaced.....	7	1.96	9	2.52
Draft timbers, two, on same end, replaced.....	11	3.08	13	3.64
Draft timbers, one, extending beyond body bolster, renewed.....	12	3.36	13	3.64
Draft timbers, two, extending beyond body bolster, renewed.....	16	4.48	17	4.76
Draft timbers, one, renewed, when its center sill is renewed or spliced, at same end of car.....	2½	.70	2½	.70
Draft timbers, one, renewed, when its opposite center sill at same end of car is renewed or spliced.....	3½	.98	3½	.98
Draft timber filler blocks, renewed, when draft timbers are not renewed.....	2	.56	2	.56
Draft timbers, tightened, one end, no additional labor for tightening when draft bolt or bolts are applied.....	½	.14	½	.14
Draft rod key, repaired.....	1	.28	1	.28
Drop end gate, replacing on authority of defect card.....	1	.28		
Drop end gate (1 plank), plain, renewed.....	1½	.42		
Drop end gate (1 plank), metal bound, renewed.....	2	.56		
Drop end gate (2 or 3 plank), plain, renewed.....	3	.84		
Drop end gate (2 or 3 plank), metal bound, renewed.....	5	1.40		
Drop end gate plank, plain, one, renewed.....	1½	.42		
Drop end gate plank, plain, two on same end, renewed.....	2	.56		
Drop end gate plank, metal bound, one, renewed.....	2½	.70		
Drop end gate plank, metal bound, two, same end, renewed.....	4½	1.26		

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Drop end gate cleat or stop, one, renewed	1 1/4	\$0.35		
Drop end gate hinge, one, renewed	1	.28		
Drop end gate keeper or latch, one, renewed	1 1/2	.14		
Drop door chain, one, renewed	1 1/2	.14		
Drop door plank, each, renewed	1	.28		
Drop door shaft and ratchet, either or both, renewed	1 1/2	.42		
Drop door shaft, blacksmith labor, repairing	1 1/2	.42		
Drop door shaft pawl, one, renewed	1 1/2	.14		
Drop door shaft key, one, renewed	1/4	.07		
End planks on Gondola cars, on same end without corner bands, one plank, renewed	2 1/4	.63		
Without corner bands, each additional plank, renewed	1	.28		
With corner bands, bolted or riveted, one plank, renewed	5	1.40		
With corner bands, bolted or riveted, each additional plank, renewed	3 1/2	.98		
End plate, one, replaced	14	3.92	15 1/2	\$4.34
Flooring boards, renewed, per lineal foot		.22		.30
Follower tie strap, one, renewed	1/2	.14	1/2	.14
Fascia or drip moulding, renewed, per lineal foot		.03		.03
Hand hold, removed and straightened, one	1	.28	1	.28
Hand hold, straightened on car, one or two	1/4	.07	1/4	.07
Hand rail rod or pipe, per side, separately, renewed	1 1/2	.42		
Hand rail post, including rail removed and replaced	2	.56		
Hand rail post, each, additional	1/2	.14		
Hay box, complete, renewed	3 1/2	.98		
Hay box door, one, renewed	2	.56		
Head block casting (tank car), one, renewed	3	.84		
Journal boxes, on arch bar truck				
One, replaced	2	.56	2	.56
Each additional, on same truck, replaced	1 1/2	.42	1 1/2	.42
Journal boxes, on solid pedestal truck				
One or two, replaced on same axle	4	1.12	4	1.12
Three or four, replaced on same truck	7	1.96	7	1.96
Journal truing up, one or two, on same axle	2	.56	2	.56
Journal wedge, renewed or replaced, separately	1/4	.21	1/4	.21
Ladder complete (wood), renewed	2 1/2	.70	2 1/2	.70
Ladder stile (wood), one, renewed	1 1/2	.42	1 1/2	.42
Ladder treads (wood), one or two, renewed	1/2	.14	1/2	.14
Letter or number board, one, renewed	1/4	.21	1/4	.21
Lining, renewed, per square foot		.03		.04
Nuts only, 1 1/4-inch or under, replacing four or less	1/4	.07	1/4	.07
Nuts only, 1 1/4-inch or over, replacing one or two	1/4	.07	1/4	.07
Pedestal tie bolt or casting, either one or both, renewed	1/2	.14	1/2	.14
Pedestal tie strap, one, renewed	1/2	.14	1/2	.14
Pipe hanger cap or clamp, one, renewed	1/4	.07	1/4	.07
Pipe hanger, complete, renewed	1/2	.14	1/2	.14
Pipe hanger, blacksmith labor, repairing	1/2	.14	1/2	.14
Pipe hanger tightening, one or two	1/4	.07	1/4	.07
Platform end sill plank, one, full length, replaced	2	.56	2	.56
Platform end sill plank, one half section replaced	1	.28	1	.28
Post, door or side, each, renewed	3 1/2	.98	6	1.68
Post, corner or end, each, renewed	4 1/2	1.26	7	1.96
Post, corner, door, end or side, each, renewed, where associated with renewal of side sill or inside end sill, side or end plate	2 1/2	.70	3 1/2	.98
Push rod guide, one, renewed	1/2	.14	1/2	.14
Push pole pocket (bolted), one, renewed	1/4	.21	1/4	.21
Push pole pocket, blacksmith labor, repairing	1/2	.14	1/2	.14
Releasing lever (coupler), one, replaced	1/4	.21	1/4	.21
Release lever (coupler), repaired, on car	1/4	.07	1/4	.07
Release lever bracket (coupler), one, renewed	1/2	.14	1/2	.14
Re-nailing roofing and siding, per lineal foot		.015		.015
Rod, vertical tie rod, one, renewed	1/4	.21	1/4	.21
Rod, vertical tie rod, blacksmith labor, repairing	1/2	.14	1/2	.14
Rod or pipe, side or center hitch (stock car), one, renewed	1/4	.21		
Roof boards, single, including removing and replacing running boards, per lineal foot		.10		.10

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Roof boards, double board roof, including removing and replacing running board, per lineal foot.....	.....	\$0.15	.....	\$0.15
Roof purline, one, renewed.....	1	.28	1	.28
Roping staple, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Roping staple, blacksmith labor, repairing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Running board, longitudinal, complete, applied.....	10	2.80	10	2.80
Running board, renewed, per lineal foot, per single board.....	.....	.02	.....	.02
Running board saddle, separate, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Running board bracket, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Running board bracket, blacksmith labor repairing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Running board extension block, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Safety chain hook or link (end sill), one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Safety valves, one or two, per tank, testing and stenciling only.....	1	.28	.....	.....
Safety valve, one, per tank, adjusting, testing and stenciling.....	2	.56	.....	.....
Safety valves, two, per tank, adjusting, testing and stenciling.....	3	.84	.....	.....
Side bearing, one, renewed.....	$1\frac{1}{2}$	.42	$1\frac{1}{2}$	.42
Side bearing, each additional, at same end of car, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Spring plank, one, replaced.....	8	2.24	8	2.24
Side planks on gondola car (with corner bands), spliced, one.....	4	1.12	.....	.....
Side plank on gondola cars:	.....	.....	.....	.....
Without corner bands, spliced, one.....	$3\frac{1}{2}$	.98	.....	.....
Side planks on gondola cars, renewed:	.....	.....	.....	.....
Without corner bands, one plank.....	7	1.96	.....	.....
Without corner bands, each additional plank.....	6	1.68	.....	.....
With corner bands, bolted or riveted, one plank.....	10	2.80	.....	.....
With corner bands, bolted or riveted, each additional plank.....	5	1.40	.....	.....
Side silt or end silt (stock car), nailed one, renewed.....	$\frac{1}{2}$	.14	.....	.....
Side silt (stock car), inside or outside, bolted, one, renewed.....	1	.28	.....	.....
Silt, end (stock car), bolted or riveted, one, renewed.....	1	.28	.....	.....
Sheave wheel in brake rod, one, renewed.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Sill step, bolted, one, renewed.....	$\frac{1}{2}$	.21	$\frac{1}{2}$	.21
Sill step, blacksmith labor, repairing.....	$\frac{1}{2}$	.14	$\frac{1}{2}$	.14
Sill steps, handholds and ladder treads, tightening, four or less.....	$\frac{1}{4}$	.07	$\frac{1}{4}$	.07
Side plate, one, applied.....	35	9.80	45	12.60
Side plate, one, spliced.....	11	3.08	20	5.60
Siding removed and replaced, per lineal foot.....	.....	.18	.....	.22
Siding removed and replaced, per lineal foot, where nails are set and holes puttied.....	.....	.....	.....	.26
1 center sill spliced, per end.....	22	6.16	30	8.40
2 center sills, spliced, same end.....	30	8.40	40	11.20
1 center sill, renewed.....	44	12.32	66	18.48
2 center sills, renewed.....	52	14.56	80	22.40
1 end sill under siding, renewed.....	18	5.04	22	6.16
1 end sill outside siding, renewed.....	8	2.24	8	2.24
1 end sill under siding, renewed, when one or more defective sills are renewed or spliced.....	8	2.24	10	2.80
1 end sill outside siding, renewed, when one or more defective sills are renewed or spliced.....	$4\frac{1}{2}$	1.26	$4\frac{1}{2}$	1.26
1 intermediate sill, renewed.....	39	10.92	57	15.96
2 intermediate sills, renewed.....	44	12.32	67	18.76
3 intermediate sills, renewed.....	53	14.84	85	23.80
4 intermediate sills, renewed.....	58	16.24	95	26.60
1 intermediate sill and 1 center sill, renewed.....	49	13.72	76	21.28
1 intermediate sill and 2 center sills, renewed.....	57	15.96	90	25.20
2 intermediate sills and 1 center sill, renewed.....	54	15.12	84	23.52
2 intermediate sills and 2 center sills, renewed.....	62	17.36	98	27.44
3 intermediate sills and 1 center sill, renewed.....	62	17.36	104	29.12
3 intermediate sills and 2 center sills, renewed.....	70	19.60	118	33.04
4 intermediate sills and 1 center sill, renewed.....	68	19.04	114	31.92
4 intermediate sills and 2 center sills, renewed.....	76	21.28	120	33.60
1 intermediate sill, spliced.....	15	4.20	21	5.88
1 side sill and 1 center sill, renewed.....	63	17.64	95	26.60
1 side sill and 2 center sills, renewed.....	71	19.88	109	30.52
2 side sills and 1 center sill, renewed.....	82	22.96	124	34.72
2 side sills and 2 center sills, renewed.....	90	25.20	138	38.64

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
1 side sill, spliced.....	15½	\$ 4.34	20	\$ 5.80
1 side sill, renewed.....	39	10.92	58	16.24
2 side sills, renewed.....	30	16.80	89	24.92
1 side sill and 1 intermediate sill, renewed.....	48	13.44	78	21.84
1 side sill and 2 intermediate sills, renewed.....	53	14.84	95	26.80
1 side sill and 3 intermediate sills, renewed.....	57	15.96	113	31.64
1 side sill and 4 intermediate sills, renewed.....	63	17.64	131	36.68
2 side sills and 1 intermediate sill, renewed.....	64	17.92	107	29.96
2 side sills and 2 intermediate sills, renewed.....	70	19.60	125	35.00
2 side sills and 3 intermediate sills, renewed.....	76	21.28	143	40.04
2 side sills and 4 intermediate sills, renewed.....	82	22.96	161	45.08
1 side, 1 intermediate and 1 center sill, renewed.....	69	19.32	113	31.64
2 side, 1 intermediate and 1 center sill, renewed.....	88	24.64	142	39.76
1 side, 2 intermediate and 1 center sill, renewed.....	75	21.00	131	36.68
2 side, 2 intermediate and 1 center sill, renewed.....	94	26.32	160	44.80
1 side, 3 intermediate and 1 center sill, renewed.....	81	22.68	149	41.72
2 side, 3 intermediate and 1 center sill, renewed.....	100	28.00	178	49.84
1 side, 4 intermediate and 1 center sill, renewed.....	87	24.36	167	46.76
2 side, 4 intermediate and 1 center sill, renewed.....	106	29.68	196	54.88
1 side, 1 intermediate and 2 center sills, renewed.....	77	21.56	127	35.56
2 side, 1 intermediate and 2 center sills, renewed.....	96	26.88	156	43.68
1 side, 2 intermediate and 2 center sills, renewed.....	83	23.24	145	40.60
2 side, 2 intermediate and 2 center sills, renewed.....	89	24.92	163	45.64
1 side, 3 intermediate and 2 center sills, renewed.....	95	26.60	181	50.68
2 side, 3 intermediate and 2 center sills, renewed.....	102	28.56	174	48.72
2 side, 4 intermediate and 2 center sills, renewed.....	108	30.24	192	53.76
2 side, 4 intermediate and 2 center sills, renewed.....	114	31.92	210	58.80
Each side or intermediate sill, spliced, when longitudinal sills have to be renewed, or when other sills are spliced at same end.....	5	1.40	8	2.24
1 center sill, spliced, when intermediate or side sills have to be renewed.....	10	2.80	13	3.64
1 center sill, spliced, when other center sill has to be renewed.....	8	2.24	10	2.80
Sill stiffener or furring strip, bolted, per section, renewed.....	1	.28	1	.28
Sill stiffener or furring strip, nailed, per section, renewed.....	1	.14	½	.14
Stakes, end or side, on gondola cars, applied, each.....	2	.56	.....	.....
Stake pocket (wooden car), each, renewed.....	½	.14	.....	.....
Stake pocket, blacksmith labor, repairing.....	½	.07	.....	.....
Stake pocket "U" bolt, one, renewed.....	½	.07	.....	.....
Stake pocket "U" bolt, blacksmith labor, repairing.....	½	.21	½	.21
Strap or anchor bolt, one, renewed.....	½	.14	½	.14
Strap or anchor bolt, blacksmith labor, repairing.....	1	.28	1	.28
Striking plate, one, renewed.....	½	.14	½	.14
Striking plate, blacksmith labor, repairing.....	.....	.....	.....	.....
Sub-flooring, including cleats, when not associated with sill renewals, per lineal foot.....	1	.04	.....	.04
Tank head block, not including casting, one, renewed.....	1	1.12	.....	.....
Tank head block casting, one, renewed.....	3	.84	.....	.....
Tank, raised to apply draft bolts, empty car, per end.....	4	1.12	.....	.....
Tank, raised to apply draft bolts, loaded car, per end.....	6	1.68	.....	.....
Train pipe, replaced and tightened, when shifted.....	1	.28	.....	.28
Truck hanger (swing motion truck), renewed.....	3½	.98	3½	.98
Truck hanger, two, same end of car (swing motion truck), renewed.....	4	1.12	4	1.12
Truck hanger, blacksmith labor, repairing.....	1½	.42	1½	.42
Truck hanger pin, separately (swing motion truck), renewed.....	2	.56	2	.56
Truck hanger pin, blacksmith labor, repairing.....	1½	.14	½	.14
Truck hanger pin seat, one, renewed.....	1½	.42	1½	.42
Truck spring, replacing, one or cluster, when out of place, loaded car.....	1½	.42	1½	.42
One end of bolster.....	2	.56	2	.56
At both ends of bolster.....	2	.56	2	.56
Truck springs, one or all, in same truck, renewed.....	10	2.80	10	2.80
Truck transom, one, wood, renewed.....	12	3.36	12	3.36
Truck transom, two, wood, replacing in same truck.....	2	.56	2	.56
Truck truss rod, outside, one, renewed.....	10	2.80	10	2.80
Truck truss rod, center, one, renewed.....	2	.56	2	.56
Truck truss rod, blacksmith labor, repairing.....	1	.28	1	.28
Truck truss rod saddle, one, renewed.....	2	.56	2	.56

LABOR.	ORDINARY CARS.		REFRIGERATOR CARS.	
	Hours.	Charge for Labor.	Hours.	Charge for Labor.
Truss rod, body bolster, one, renewed.....	1½	\$0.42	1½	\$0.42
Truss rod, body bolster, blacksmith labor, repairing.....	1	.28	1	.28
Trussing car, empty.....	1½	.42	1½	.42
Trussing car, loaded.....	2	.56	2	.56
Truss rod, across end of car, one, renewed.....	1	.28	1	.28
Trussing truck bolster, empty car.....	1	.28	1	.28
Trussing truck bolster, loaded car.....	1½	.42	1½	.42
Truss rod turnbuckle, one, renewed.....	1	.28	1	.28
Turnbuckle lock, one, renewed.....	½	.14	½	.14
Weighting and re-stenciling stock cars, net.....		1.25		
Weighting and re-stenciling other cars, net.....		1.00		1.00
When necessary to remove load to make repairs at one end of car.....	3½	.98	3½	.98

#### REPAIRS OF STEEL OR STEEL PARTS OF COMPOSITE CARS.

All rivets  $\frac{1}{2}$  inch diameter or over, 14 cents net per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splicing and replacing damaged parts, not to include straightening.

All rivets  $\frac{1}{4}$  inch diameter and less than  $\frac{1}{2}$  inch diameter, 8 cents net per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splices and replacing damaged parts, not to include straightening.

Straightening or repairing parts removed from damaged car, 60 cents per 100 pounds.

Straightening or repairing parts in place on damaged car, also any part that requires straightening, repairing or renewing, not included on rivet basis, 28 cents per hour.

Repairs of steel tanks of tank cars:

Labor, repairing and testing, per hour.....	\$0.40
Steaming, per tank.....	.75
Water for testing, per 1,000 gallons.....	.06

In making repairs to cars on a rivet basis, the cost of removing and replacing fixtures not secured by rivets, but necessarily removed in order to repair or renew adjacent defective parts, should be in addition to the rivet basis; rules covering wood car repairs to govern.

**RULE 108.** No charge to be made for labor of replacing or applying M. C. B. knuckles, knuckle locks, knuckle pins, clevises, clevis pins, lift chains, brake shoes or brake-shoe keys, or applying side and end doors, except on the authority of a defect card.

No charge to be made for adjusting brakes, angle cocks or tightening unions.

**RULE 109.** When it is necessary to apply an M. C. B. coupler complete, on account of a broken or missing knuckle or lock, the usual labor charge for replacing a coupler can be made.

When one or more carrier-iron bolts over 6 inches long are replaced, and pocket coupler at same end of car is removed and replaced, the regular labor charge for applying carrier-iron bolts should be reduced one-fourth hour for each bolt.

When one draft timber is renewed the regular labor charge for renewing carrier-iron bolts over 6 inches long, passing through or adjacent to mate draft timber, should be reduced one-fourth hour per bolt.

When carrier-iron bolts over 6 inches long do not pass through draft timber, the regular carrier-iron bolt labor shall

be reduced one-fourth hour per bolt when such bolts are renewed at same time one or both draft timbers or pocket coupler are renewed at that end of car.

**RULE 110.** No additional labor to be charged for:

Applying end sheathing when end plate or end sill under sheathing is renewed or replaced, also side sheathing when side sill or side plate is removed or replaced.

Applying center pins or friction rollers or putting car on center when center plates or center-plate bolts are applied at same end.

Applying center plate or center-plate bolts when car is raised to standard height by adjusting center plates or body bolster, at same end of car.

Applying dead block or platform plank when end sill is applied at same end.

Applying coupler when draft timber, one or both, is applied at the same end.

Applying brake hangers when brake beam is applied.

**RULE 111.** The following table shows the labor charges allowable for air-brake repair work: The letters "R. & R." mean "removed and replaced."

	Cents.
Air hose, R. & R.....	4
Angle cock, R. & R.....	8
Angle cock handle, renewed.....	4
Angle cock, grinding in, R. & R.....	28
Check valve case, spring, gasket, or all, R. & R.....	10

DETAILS.	Cents.
Disconnecting union .....	3
Check valve case (two cap screws).....	2
Emergency valve seat.....	5
<b>Total .....</b>	<b>10</b>

Coupler dummy, R. & R. (1 lag screw).....	1
Cut-out cock, R. & R.....	9

DETAILS.	Cents.
1 pipe union disconnected.....	3
2 pipe connections .....	6
<b>Total .....</b>	<b>9</b>

Cut-out cock, grinding in, R. & R.....	30
Cut-out cock handle, renewed.....	4
Cylinder, R. & R., detachable.....	23
Cylinder, R. & R., combined type.....	30

DETAILS.	Cents.
Push rod (1 connecting pin).....	3
Clamping piston (1 cap screw).....	2
Cylinder head, R. & R. (4 nuts, $\frac{1}{2}$ inch, 1 cent each) .....	4
Disconnecting cylinder from reservoir (7 nuts, $\frac{1}{2}$ inch, 1 cent each).....	7
Reclamping cylinder piston (1 cap screw).....	2
Removing cylinder from car (6 nuts, $\frac{1}{2}$ inch, 2 cents each) .....	12
<b>Total</b> .....	<b>30</b>

Cylinder and reservoir, R. & R. .... 41 Cents.

DETAILS.	Cents.
Removing push rod (1 connecting pin).....	3
Removing cylinder head (4 nuts, $\frac{1}{2}$ inch, 1 cent each) .....	4
Removing cylinder from car (6 nuts, $\frac{1}{2}$ inch, 2 cents each) .....	12
Removing reservoir from car (2 nuts, $\frac{1}{2}$ inch, 2 cents each) .....	4
Removing release rods (2 spring cotters).....	4
Removing release valve .....	2
Removing two plugs .....	2
Removing triple (2 nuts, $\frac{1}{2}$ inch, 2 cents each)..	4
Disconnecting train pipe union.....	3
Disconnecting retaining pipe unions.....	3
<b>Total</b> .....	<b>41</b>

Cylinder and reservoir, tightening when loose (8 nuts, 1c each) 8

Cylinder cleaned, oiled, tested and stenciled, including obliterating old stencil marks..... 38

DETAILS.	Cents.
Removing push rod (1 connecting pin).....	3
Clamping cylinder piston (1 cap screw).....	2
Removing cylinder head (4 nuts, $\frac{1}{2}$ inch, 1 cent each) .....	4
Cleaning, testing and stenciling.....	29
<b>Total</b> .....	<b>38</b>

Cylinder release spring, R. & R. .... 11

DETAILS.	Cents.
Removing push rod (1 connecting pin).....	3
Clamping cylinder piston (1 cap screw).....	2
Removing cylinder head (4 nuts, $\frac{1}{2}$ inch, 1 cent each) .....	4
Reclamping cylinder head (1 cap screw).....	2
<b>Total</b> .....	<b>11</b>

	Cents.
Cylinder gasket, R. & R.....	25

DETAILS.	Cents.
Disconnecting triple union .....	3
Disconnecting retaining pipe union.....	3
Disconnecting reservoir block (2 nuts, $\frac{1}{8}$ inch, 2 cents each) .....	4
Disconnecting reservoir from cylinder (7 nuts, $\frac{1}{8}$ inch, 1 cent each) .....	7
Removing push rod (connecting pin).....	3
Clamping cylinder piston.....	1
Removing release rods (2 spring cotters).....	4
<b>Total .....</b>	<b>25</b>

Emergency check valve, grinding in.....	10
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Emergency valve piston, R. & R.....	10
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DETAILS.	Cents.
Disconnecting union .....	3
Removing check valve case (2 cap screws).....	2
Removing emergency valve seat.....	5
<b>Total .....</b>	<b>10</b>

Emergency valve seat, R. & R. (See E. V. piston).....	10
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Emergency valve, rubber seat, R. & R.....	10
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DETAILS.	Cents.
Disconnecting union .....	3
Removing check valve case (2 cap screws).....	2
Removing riveted pin .....	4
Removing emergency valve nut.....	1
<b>Total .....</b>	<b>10</b>

Cylinder piston packing, R. & R.....	13
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DETAILS.	Cents.
Removing push rod (1 connecting pin).....	3
Clamping cylinder piston (1 cap screw).....	2
Removing cylinder head (4 nuts, $\frac{1}{8}$ inch, 1 cent each) .....	4
Removing leather packing (4 nuts, $\frac{1}{8}$ inch, 1 cent each) .....	4
<b>Total .....</b>	<b>13</b>

Cylinder piston, R. & R.....	15
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DETAILS.	Cents.
Removing push rod (1 connecting pin).....	3
Clamping cylinder piston (1 cap screw).....	2
Removing cylinder head (4 nuts, $\frac{1}{8}$ inch, 1 cent each) .....	4
Removing leather packing (4 nuts, $\frac{1}{8}$ inch, 1 cent each) .....	4
Reclamping cylinder piston (1 cap screw).....	2
<b>Total .....</b>	<b>15</b>

	Cents.
Dirt collector in branch pipe, cleaned, drained and stenciled..	5
Gasket, air hose, coupling, renewed.....	2
Graduating valve, reground, round type, 8-inch or 10-inch, each	15
Graduating valve, reground flat type, 8-inch or 10-inch, each...	25
Oil plugs, R. & R., each.....	2
Packing leather expander, renewed. (See cylinder piston)...	7
Pipe, train or branch, R. & R., for each connection made.....	3
Push rod, R. & R. (1 connecting pin).....	3
Release valve, renewed.....	6

DETAILS.	Cents.
Disconnecting release rod (s spring cotters).....	4
Disconnecting release valve .....	2
<b>Total .....</b>	<b>6</b>
Release valve, removed, repaired and replaced (R. & R. 4c)...	9
Release valve rod, removed, repaired and replaced.....	3

DETAILS.	Cents.
1 spring cotter.....	2
Removing staple .....	1
<b>Total .....</b>	<b>3</b>

Reservoir, R. & R..... 29

DETAILS.	Cents.
Removing from car (s nuts, $\frac{3}{4}$ inch, s cents each)	4
Disconnecting from cylinder (7 nuts, $\frac{3}{4}$ inch, 1 cent each) .....	7
Removing release rods (s spring cotters).....	4
Removing release valve .....	2
Removing two plugs .....	2
Removing triple valve (s nuts, $\frac{3}{4}$ inch, s cents each) .....	4
Disconnecting union .....	3
Disconnecting union, retaining pipe.....	3
<b>Total .....</b>	<b>29</b>

Removing cylinder cap (3 nuts,  $\frac{3}{2}$  inch, 1c each)..... 3  
 Removing slide valve (3 nuts,  $\frac{1}{2}$  inch, 1c each)..... 3  
 Retaining valve repaired .....

DETAILS.	Cents.
Retaining valve handle, R. & R.....	2
Retaining valve case, R. & R.....	1
Retaining valve, ground in.....	5
Retaining valve, cock key, ground in.....	15
Retaining valve, cock key and spring, R. & R... ..	2

**25**

Cents.

Retaining valve, R. & R. (2 lag screws 2c, valve 3c).....	5
Slide valve, removed, ground in and replaced.....	33
Slide valve spring, R. & R.....	6

DETAILS.	Cents.
Cylinder cap (3 cap screws).....	2
Removing riveted pin.....	4
<b>Total</b> .....	<b>6</b>

Slide valve spring, R. & R., removing riveted pin.....	4
Strainer, renewed (disconnecting union).....	3
Triple-cylinder bushing, reground or refitted.....	\$1.12
Triple cylinder cap, R. & R. (3 nuts, 1/2 inch, 1c each).....	3
Triple cylinder cap gasket, renewed (3 nuts, 1/4 inch, 1c each, gasket, 2c) .....	5
Triple piston packing ring, renewed.....	22
Triple valve, removed, cleaned, oiled, tested and stenciled....	45

DETAILS.	Cents.
Train pipe union, disconnected.....	3
Retaining pipe union, disconnected.....	3
Removing triple (2 nuts, 3/4 inch, 2 cents each)..	4
Check valve case (2 cap screws).....	2
Emergency valve seats.....	5
Cylinder cap (3 bolts).....	3
Cleaning, testing and stenciling.....	25
<b>Total</b> .....	<b>45</b>

Triple valve gasket, renewed.....	10
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NOTE.—Not to be allowed when triple valve is oiled, cleaned or removed for other repairs.

DETAILS.	Cents.
Disconnecting branch pipe union.....	3
Disconnecting retaining pipe union.....	3
Removing triple (2 nuts, 3/4 inch, 2 cents each)..	4
<b>Total</b> .....	<b>10</b>

Unions disconnected and connected.....	3
--	---

The following basic units must not be used in rendering bills in the foregoing schedule, but may only be used in determining cost of other combinations of air brake repairs not mentioned.

	Cents.
Cap screws or bolts, R. & R., 1 or more.....	2
Cylinder cleaning, testing and stenciling.....	29
Emergency valve seat, R. & R.....	5
Graduating stem nut, R. & R.....	2
Lag or wood screws, R. & R., each.....	1
Nuts tightened when loose, each.....	1
Nuts, $\frac{1}{2}$ inch or less, R. & R., 1 or 2 on same bolt .....	1
Nuts, $\frac{3}{4}$ inch or over, R. & R., 1 or 2 on same bolt .....	2
Pins connecting R. & R. (including split key)...	3
Pins riveted, R. & R., each.....	4
Plugs, oil, R. & R., each.....	1
Spring cotter, R. & R., each.....	2
Staples, R. & R., each.....	1
Testing air (after repairs).....	5
Threads on pipe, cutting, per coupling.....	5
Train or branch pipe, disconnected and connected, or only connected, each connection.....	3
Triple valve, cleaning, testing and stenciling....	25
Unions disconnected and connected.....	3

### SETTLEMENT FOR CARS.

**RULE 112.** The company on whose line the bodies or trucks are destroyed shall report the fact to the owner immediately after their destruction, and shall have the option of rebuilding or settling for same.

**RULE 113.** For the mutual advantage of railway companies interested, the settlement for a car owned or controlled by a railway company, when damaged or destroyed upon a private track, shall be assumed by the railway company delivering the car upon such tracks.

**RULE 114.** If the company on whose line the car is destroyed elects to rebuild either body or trucks, or both, the original plan of construction must be followed, and the original kind and quality of materials used. In such cases no allowance shall be made for betterments.

**RULE 115.** If only the body of a car is destroyed, and the company destroying it elects to return the trucks, they shall be put in good order, or accompanied by a defect card, covering all defects or improper repairs made by them for which owners are not responsible, and forwarded, with 60 days, free of freight or other charges, to the nearest point on the line of the company owning or operating the car, and the number, line and class of car destroyed shall be stenciled or painted on each truck so returned.

Except in cases of trucks of 50,000 lbs. capacity or less,

when the railroad company destroying the body of car may elect to retain the trucks and settle for them at their scrap value, except that such of the wheels or all-metal brake beams as are good for further service must be credited at their secondhand value under the M. C. B. rules. This paragraph will not apply to trucks belonging to individual ownership.

The underframes of damaged steel and steel underframe cars, when intact and in serviceable condition, may be forwarded to the owner on defect card, in which case it must be accepted by the owner.

**RULE 116.** The settlement prices of new eight-wheel cars shall be as follows, with an addition of \$27.50 for each car equipped with 8-inch air-brake equipment and \$35 for 10-inch air-brake equipment. The road destroying a car with air brakes may elect to return the air-brake apparatus, including such attachments as are usually furnished by the air-brake manufacturer, complete and in good condition:

#### BODIES OF EIGHT-WHEEL CARS.

##### WOOD.

Box, 40 feet long or over.....	\$440.00
Box, 36 feet long or over, but under 40 feet.....	385.00
Box, 34 feet long or over, but under 36 feet.....	360.00
Box, 32 feet long or over, but under 34 feet.....	330.00
Box, under 32 feet long.....	265.00
Box, ventilated, 40 feet long or over.....	470.00
Box, ventilated, 36 feet long or over, but under 40 feet....	415.00
Box, ventilated, 34 feet long, but under 36 feet.....	385.00
Flat, plain, 40 feet long or over.....	200.00
Flat, plain, 32 feet long or over, but under 40 feet.....	155.00
Flat, plain, under 32 feet long.....	110.00
Gondola, drop bottom, 40 tons capacity or over.....	330.00
Gondola, drop bottom, 30 tons capacity or over, but under 40 tons .....	300.00
Gondola, drop bottom, 25 tons capacity or over, but under 30 tons .....	275.00
Gondola, drop bottom, 20 tons capacity or under.....	200.00
Gondola, hopper bottom, 50 tons capacity.....	440.00
Gondola, hopper bottom, 40 tons capacity or over, but under 50 tons.....	360.00
Gondola, hopper bottom, 30 tons capacity or over, but under 40 tons.....	330.00
Gondola, hopper bottom, 25 tons capacity, but under 30 tons .....	290.00
Gondola, hopper bottom, 20 tons capacity or less.....	220.00

Gondola, plain, 40 tons capacity, but under 50 tons.....	\$300.00
Gondola, plain, 30 tons capacity, but under 40 tons.....	275.00
Gondola, plain, 25 tons capacity, but under 30 tons.....	250.00
Gondola, plain, under 25 tons.....	140.00
Stock, 34 feet long or over.....	330.00
Stock, 32 feet long or over, but under 34 feet.....	300.00
Stock, under 32 feet long.....	265.00
Self-clearing hopper, 30 tons, but less than 40 tons.....	295.00
Self-clearing hopper, 40 tons, but less than 50 tons.....	315.00
Self-clearing hopper, 50 tons capacity and over.....	400.00

The lengths of cars above mentioned refer to the lengths over the end sills.

In the case of double-deck stock cars, \$25.00 may be added to the prices given above for stock cars.

When cars of 60,000 pounds capacity or over, and so stenciled, have trucks with journals  $4\frac{1}{4}$  inches or over in diameter when new, \$40 per car shall be added to the figure as given above for the value of car body, when equipped with metal body bolsters.

When cars are equipped with metal center sills, the following prices shall be added to the values of bodies for cost of such metal sills:

10 inches or more.....	\$80.00
Less than 10 inches.....	60.00

When a car is equipped with two metal draft members not less than 7 inches in depth continuous from end to end of car, in combination with metal needle beams, \$40.00 shall be added to the value of the body of the car for the cost of such metal draft members.

## BODIES OF EIGHT-WHEEL CARS.

### STEEL.

Box, wooden body, metal underframe, 50 tons capacity, 38 feet 6 inches or over, over end sills.....	\$825.00
Box, wooden body, metal underframe, less than 50 tons capacity, 36 feet long or over, over end sills.....	740.00
Box, wooden body, metal underframe, 50 tons capacity and over, 40 feet over end sills.....	850.00
Box, wooden body, metal underframe, 30 tons capacity and over, 36 feet long, over end sills.....	725.00
Box, wooden body, metal underframe, 40 tons capacity and over, 36 feet long, over end sills.....	750.00

Box, wooden body, metal underframe, 40 tons capacity and over, 38 feet long, over end sills.....	\$775.00
Box, wooden body, metal underframe, 40 tons capacity and over, 40 feet long, over end sills.....	800.00
Box, all steel, 50 tons capacity and over, 38 feet 6 inches Per Lb. and over, over end sills.....	.0325
Box, all steel, 50 tons capacity and over, 40 feet over end sills .....	.0325
Box, all steel, 40 tons capacity and over, 38 feet 6 inches over end sills.....	.0325
Box, all steel, 40 tons capacity and over, 40 feet over end sills .....	.0325
Flat, wooden floor, metal underframe, 30 tons capacity, 34 feet long or over, over end sills.....	.0325
Flat, wooden floor, metal underframe, 50 tons capacity, 40 feet over end sills.....	.0325
Flat, wooden floor, metal underframe, 40 tons capacity, 40 feet over end sills.....	.0325
Flat, wooden floor, metal underframe, 40 tons capacity or over, but under 50 tons, 34 feet long over end sills, but under 40 feet.....	.0325
Flat, wooden floor, metal underframe, 50 tons capacity and over, 40 feet long and over, over end sills.....	.0325
Gondola, all steel, drop bottom, 30 tons capacity or over, but under 40 tons.....	.0325
Gondola, all steel, drop bottom, 40 tons capacity or over, but under 50 tons.....	.0325
Gondola, all steel, drop bottom, 50 tons capacity or over, but under 70 tons.....	.0325
Gondola, all steel, drop bottom, 70 tons capacity and over.	.0325
Gondola, all steel, solid bottom, 50 tons capacity and over, but under 70 tons.....	.0325
Gondola, all steel, solid bottom, 70 tons capacity and over.	.0325
Gondola, all steel, solid bottom, 40 tons capacity and over, but under 50 tons.....	.0325
Gondola, all steel, solid bottom, 30 tons capacity and over, but under 40 tons.....	.0325
Gondola, wooden body, metal underframe, solid bottom, 30 tons capacity and over, but under 40 tons.....	\$650.00
Gondola, wooden body, metal underframe, solid bottom, 40 tons capacity, but under 50 tons.....	675.00
Gondola, wooden body, metal underframe, solid bottom, 50 tons capacity and over, but under 70 tons.....	700.00
Gondola, wooden body, metal underframes, solid bottom, 70 tons capacity and over.....	820.00

Gondola, all metal, twin drop bottom, 40 tons capacity, Per Lb. but less than 50 tons capacity, 36 feet, but under 40 feet .....	.0325
Gondola, all metal, hopper bottom, 50 tons capacity, 33 feet over end sills.....	.0325
Gondola, all metal, drop bottom, 50 tons capacity, 40 feet over end sills.....	.0325
Gondola, all metal, plain, 50 tons capacity, 40 feet over end sills .....	.0325
Gondola, wooden body, metal underframe, flat bottom, 40 feet over end sills.....	\$790.00
Gondola, wooden body, metal underframe, hopper bottom, 32 feet over end sills, but under 40 feet.....	650.00
Hopper, all steel, self-clearing, 30 tons capacity and over, Per Lb. but under 40 tons.....	.0325
Hopper, all steel, self-clearing, 40 tons capacity and over, but under 50 tons.....	.0325
Hopper, all steel, self-clearing, 50 tons capacity and over, but under 70 tons.....	.0325
Hopper, all steel, self-clearing, 70 tons capacity and over..	.0325
Hopper, self-clearing wooden body, steel underframe, 50 tons capacity and over.....	\$750.00
Hopper, coke, all steel, self-clearing, 40 tons capacity and Per Lb. over, but under 50 tons.....	.0325
Hopper, coke, all steel, self-clearing, 50 tons capacity and over, but under 70 tons.....	.0325
Hopper, coke, all steel, self-clearing, 70 tons and over....	.0325
Gondola, all steel, self-clearing, by floor dropping on side, 40 tons capacity and over, but under 50 tons.....	.0325
Gondola, all steel, self-clearing, by floor dropping on side, 50 tons capacity and over.....	.0325
Gondola, wooden body, steel underframe, self-clearing, by floor dropping on side, 40 tons capacity and over, but under 50 tons.....	\$800.00
Gondola, wooden body, steel underframe, self-clearing, by floor dropping on side, 50 tons capacity and over....	825.00
Stock, wooden body, metal underframe, less than 50 tons capacity, 36 feet long or over, over end sill.....	715.00

To the above prices for box or stock cars with metal underframe and steel framed composite superstructure, add \$50.00 if built with sheathing boards on outside, or \$100.00 if built with sheathing boards on inside only.

## TRUCKS.

50,000 lbs. capacity and less, with metal transoms and wooden bolsters, per pair.....	\$215.00
60,000 lbs. capacity or under, with wooden bolsters, per pair .....	215.00
50,000 lbs. capacity, all metal trucks, per pair.....	225.00
60,000 lbs. capacity, but under 80,000 lbs., all metal, per pair .....	315.00
70,000 lbs. capacity, but under 80,000 lbs., with wooden bolsters, per pair.....	215.00
80,000 lbs. capacity, but under 100,000 lbs., all metal, pair..	350.00
100,000 lbs. capacity or over, but under 140,000 lbs., all metal, per pair.....	375.00
140,000 lbs. capacity or over, all metal, per pair.....	600.00

Prices include brake beams, complete, truck levers, dead-lever guides and bottom-connection rods.

For trucks with steel or steel-tired wheels an additional allowance of \$112 per car shall be made.

All trucks in service of 60,000 pounds capacity or over, which consist entirely of metal, with the exception of the spring plank, shall be known hereafter as all-metal trucks.

RULE 117. In the case of wooden car bodies, the depreciation due to age shall be figured at 6 per cent per annum upon the yearly depreciated value of such car bodies.

In the case of all-steel car bodies the depreciation shall be figured at 5 per cent per annum.

In the case of car bodies with steel underframes the depreciation shall be figured at 5½ per cent per annum, with the exception of steel underframe flat cars having wooden floors, which shall be figured at 5 per cent per annum.

The depreciation on the tanks of tank cars for handling non-corrosive substances shall be 4 per cent per annum; for tanks of tank cars handling corrosive substances the depreciation shall be 5 per cent per annum.

The depreciation on trucks other than all-metal shall be figured at 6 per cent per annum.

The depreciation on all-metal trucks shall be figured at 5 per cent per annum.

Allowances for depreciation shall in no case exceed 60 per cent of the value new.

The amounts \$27.50 and \$35.00 for air brakes shall not be subject to any depreciation.

RULE 118. The bodies of refrigerator cars, stock cars permanently fitted for stall shipments, and other freight cars, designed for special purposes, not referred to above, shall be

settled for at the present cost price, as may be agreed to by the parties in interest, less the depreciation due to age, which shall be on the same basis as for regular freight equipment.

**In the case of cars equipped with racks for carrying coke and for other such purposes, and also stock cars other than those permanently fitted for stall shipments with feeding and watering attachments, the actual cost of these equipments shall be added to the standard settlement price for such cars.**

RULE 119. Vacant. October 1, 1913. Consolidated with Rule 121.

#### DISPOSITION OF WORN-OUT AND DAMAGED CARS.

RULE 120. A car unsafe to load on account of general worn-out condition due to age, decay or corrosion, shall be jointly inspected by the handling line and a representative of owner or a disinterested line, whichever can be most conveniently obtained by handling line. If inspectors agree that home route cards are justifiable, joint inspection shall be sent to owner showing in detail all defects found on car, also an estimate of cost of temporary or partial repairs necessary to make car safe to move. Upon receipt of this information, owner shall either furnish two home route cards or authorize destruction of car. When issuing home route cards, if the car is a railroad owned car, it shall be short-routed home per Car Service Rule 3, paragraph (f), at owner's expense. If the car is a privately owned car, and the owner elects to have it sent home, he shall indicate on the home route cards the route over which it is to be returned. In either case the owner will be responsible for necessary repairs to make the car safe to move. If the owner elects to have the car destroyed, the handling line shall, in either case, allow credit for all material at M. C. B. scrap prices, less labor cost of destruction.

The joint inspection and home route cards will apply in cases of direct or indirect connection except where car is already at a junction point with car owner's line, in which case the owner must accept car as per Rule 2.

Such cards shall be attached to each side of the body of the car and of the form shown on pages 99 and 106. They shall be printed on both sides, and shall be filled in on both sides with ink or black indelible pencil.

RULE 121. When the body or trucks of a foreign car are destroyed in wreck or accident, the owner shall, upon request, furnish statement of depreciated value of body and trucks separately. If the car is not destroyed, and the owner elects, upon request, to furnish home route cards for its movement, it shall be disposed of as provided in Rule 120, but at the expense of the

company on whose line the car was damaged, the forwarding point to be designated by the owner.

A joint inspection shall be made at said designated point and settlement made on the basis of the M. C. B. rules.

### FURNISHING MATERIALS.

**RULE 122.** Companies shall promptly furnish to each other, upon requisition, and forward, freight charges collect from point of shipment, materials for repairs of their cars on foreign lines. If the material is for repairs of car owner's defects, the foreign company may bill the car owner for the entire freight charges, and in such case the car owner may reclaim freight charges for that portion of the movement over its own line. If the material is for repairs of user's defects, the foreign line may reclaim only for that portion of the movement over its line.

Requisitions for such material shall specify that same is for repairs of cars, giving car number and initial of such car, together with pattern number or other data to enable correct filling of requisition.

The company having the car in its possession at the time shall provide from its own stock the following:

Lumber, forgings, hardware stock, paint, hairfelt, piping, air-brake material and all M. C. B. Standard material.

### SETTLEMENT OF DISPUTES.

**RULE 123.** In order to settle disputes arising under the rules, and to facilitate the revision of the rules at the annual conventions of the Association, an Arbitration Committee of five representative members shall be appointed annually by the Executive Committee; three members of this committee to constitute a quorum.

In case of any dispute or question arising under the rules between the subscribers to said rules, the same may be submitted to this committee, through the Secretary, to receive consideration by the Arbitration Committee.

The abstract should set forth:

1. An agreed statement of facts.
2. Argument of plaintiff.
3. Argument of defendant.

The abstract should consist of not more than three typewritten pages, letter size, single space, and should be signed by both parties to the dispute.

Should one of the parties refuse or fail to furnish the necessary information, the committee shall use its judgment as

to whether, with the information furnished, it can properly give its opinion. The decisions of the committee shall be final and binding upon the parties concerned. This committee shall report its decisions to the Association, and its report shall be incorporated in the annual report of proceedings of the Association.

#### REVISION OF THIS CODE OF RULES.

**RULE 124.** The Arbitration Committee shall ask for suggestions of changes, amendments and additions to these rules prior to each annual convention, which it shall consider, and it shall report its recommendations to the succeeding annual convention.

**RULE 125.** In the revision of these rules by the Association, a two-thirds vote shall be necessary for adoption.

**RULE 126.** Voting powers shall be the same as prescribed in the Constitution of the Master Car Builders' Association on matters pertaining to the adoption of standards and the expenditure of money.

**RULE 127.** This Code of Rules shall be introduced for the discussion and revision at one session of the Master Car Builders' Association convention each year.

#### CONDITIONS OF ACCEPTANCE OF THIS CODE.

**RULE 128.** Any car owner or railway company may become a party to this Code of Rules by giving notice through one of its general officers to the Secretary of the Master Car Builders' Association.

Railroad companies becoming subscribers to this Code of Rules must have a representative member in the Master Car Builders' Association.

**RULE 129.** Any car owner or railway company that is a party to this Code of Rules shall be bound by same through its successive revisions, until one of its general officers files with the Secretary of the Master Car Builders' Association its notification of withdrawal.

**RULE 130.** Acceptance or rejection of this Code of Rules must be as a whole, and no exception to an individual rule or rules shall be valid.

**RULE 131.** This Code of Rules shall take effect October 1, 1913.



THE ..... RAILWAY CO.

COPY OF M. C. B. DEFECT CARD. Issued by..... Ry. At..... Date..... 191..

Inspector..... Reading as follows .....

.....

.....

.....

.....

COPY OF M. C. B. BILLING REPAIR CARD. Issued by..... Ry. At..... Date..... 191..

Inspector..... Reading as follows .....

.....

.....

.....

.....

DISPOSITION OF CAR. Carded to..... Shop; Repaired; sent forward without repairs.

Other side shown on page 726.

<i>Name of Railroad.</i> .....	<i>Place</i> .....	<i>191</i> .....
<i>This will authorize the</i> .....		
<i>to counterbill the</i> .....	<i>Railroad Company</i> .....	<i>Railroad Company</i> .....
<i>to offset charges in our bill No.</i> .....	<i>Amount \$</i> .....	<i>dollars</i> .....
<i>\$</i> .....	<i>Signature of person issuing</i> .....	
<i>This authority must be attached to bill.</i>		

M. C. B. Association Counterbilling Authority.









FROM	
.....	R. R.
TO	
.....	R. R.
VIA	
.....	
Car No. ....	Initials. ....
To be shopped for. ....	
.....	
.....	
(Head of Car Department.)	

3¼ by 8 inches.

SEE RULE 120.

FORM OF HOME CARD.

(Name of Consignor, etc.)  
 (Name of Consignor, etc., in letters not more  
 than one-half inch in any dimension.)

.....  
 Initial and No. .... Contents.....  
 Point of Shipment..... R. R.  
 Consignee and Destination.....  
 Via .....  
 Date.....

Vertical dimensions, max. 5 inches.  
 Horizontal " 8 "

To be permitted on all loaded cars.

No picture or trade-mark to be permitted.

Space for railroad information to occupy lower  
 three-fifths of card. Printing on upper two-fifths to be  
 limited to letters not exceeding one-half inch in any  
 dimension.

All printing to be in black ink.

SEE RULE 36.

#### ROUTING CARD.

### UNITED STATES ARMY.

#### Q. M. SUPPLIES.

.....  
 Initial and No. .... Contents.....  
 Point Shipment..... Via..... R. R.  
 Consignee..... Destination.....  
 Via .....  
 Date Shipment ..... Consignor.

Size 5 inches vertical dimension.  
 " 8 " horizontal "

#### ROUTING CARD FOR QUARTERMASTER'S SUPPLIES

SEE RULE 36.

## AMERICAN RAILWAY ASSOCIATION.

## Car Service Rule 15.

Unless otherwise agreed, the cost of transferring the lading of freight cars or rearrangement of lading at junction points shall be settled as follows:

First.—The delivering road shall pay cost of transfer or rearrangement:

(a) When transfer is due to defective equipment that is not safe to run, according to M. C. B. Rules.

(b) When transfer or rearrangement of load is due to contents being improperly loaded or overloaded, according to M. C. B. Rules or the Interstate Commerce Commission Regulations for the transportation of explosives and other dangerous articles by freight and by express, or when dimensions of the lading of open cars are in excess of the published clearances of any of the roads covered by the routing.

(c) When transfer is due to delivering line not desiring its equipment to go beyond junction points.

(d) When cars can not pass approved third-rail clearances of The American Railway Association.

Second.—The receiving road shall pay cost of transfer or rearrangement—

(e) When cars can not pass clearances, except as provided in paragraph (d), or when cars and lading exceed load limit or can not be moved through on account of any other disability of receiving line.\*

(f) When receiving road desires transfer to save cost of mileage or per diem.

\* NOTE TO RULE 15 (e).—The word "cars" covers both closed and open cars, but not lading on open cars. The words "load limit" refer to the limits placed on bridges, tracks, etc., and not to car capacity.

## LIST OF CAR OWNERS AND RAILWAY COMPANIES

WHICH HAVE ADOPTED THE CODE OF RULES GOVERNING THE CONDITION OF,  
AND REPAIRS TO, FREIGHT CARS FOR THE INTERCHANGE OF TRAFFIC.

*The following is a complete list of car owners and railway companies which have given notice of the adoption of the above Code of Rules.*

*Other companies which adopt this Code of Rules should notify the secretary, in accordance with the Rules, so that the names of such companies may be included in the list thereafter. Notice should be given of all changes in the names of companies in this list:*

Akron, Canton & Youngstown.	Atlanta & West Point.
Alabama Great Southern.	Atlantic & Pacific.
Alabama & Mississippi.	Atlantic Coast Line.
Alabama & Northwestern.	Atlantic Seaboard Despatch.
Alabama & Vicksburg.	Atlantic Seaboard Line.
Alameda & San Joaquin.	Atlantic, Valdosta & Western.
Albany & Hudson.	Aurora, Elgin & Chicago.
Algoma Central.	Baltimore & Ohio.
Aliquippa & Southern.	Baltimore & Ohio Southwestern.
Allegheny Valley.	Baltimore & Potomac.
American Cotton Oil Co.	Baltimore & Sparrow's Point.
American Creosoting Co.	Bangor & Aroostook.
American Fast Freight Line.	Barberton Belt.
American Linseed Co.	Barnum & Bailey.
American Milling Co.	Barrett Mfg. Co.
American Refrigerator Transit Co.	Bay Terminal.
American Tank Line.	Beech Creek.
Anglo-American Tar Products Co.	Bellefonte Central.
Ann Arbor.	Bellingham Bay & British Columbia.
Arizona & New Mexico.	Bennington & Rutland.
Arizona Eastern.	Berwind-White Coal Mining Co.
Arkansas Central.	Bessemer & Lake Erie.
Arkansas, Louisiana & Gulf.	Bessemer Coke Co.
Arkansas, Louisiana & Southern.	Bingham & Garfield.
Armour Car Lines.	Birmingham & Northwestern.
Armour Packing Co.	Birmingham Southern.
Arms Palace Horse Car Co.	Blakely Southern.
Astoria & Columbia River.	Booth's Refrigerator Line.
Atchison, Topeka & Santa Fe.	Booth's Cold Storage System.
Atlanta, Knoxville & Northern.	Boston & Albany.
Atlanta Stone, Coal & Lumber Line.	Boston & Lowell.
Atlanta, Birmingham & Atlantic.	Boston & Maine.
Atlanta & Birmingham Air Line.	

- Boston, Hoosac Tunnel & Western.  
 Brimstone Railroad & Canal Co.  
 Bristol, Elizabethton & North Carolina.  
 British Columbia Electric Ry. Co., Ltd.  
 Buffalo Creek & Gauley.  
 Buffalo, Rochester & Pittsburg.  
 Buffalo & Susquehanna.  
 Bullfrog Goldfield.  
 Burlington, Cedar Rapids & Northern.  
 Burlington & Missouri River in Nebraska.  
 Butte, Anaconda & Pacific.  
 Cairo, Vincennes & Chicago.  
 California Despatch Line.  
 California Fruit Transportation Co.  
 Cammal & Black Forest.  
 Canada Southern.  
 Canadian Northern.  
 Canadian Pacific.  
 Canadian Northern Quebec.  
 Cananea Consolidated Copper Co.  
 Cananea, Yaqui River & Pacific.  
 Canda Cattle Car Co.  
 Cape Girardeau South-Western.  
 Carlton & Coast.  
 Carolina & Gadkin River.  
 Carolina & North-Western.  
 Carolina, Clinchfield & Ohio.  
 Central Indiana.  
 Central New England.  
 Central of Georgia.  
 Central Railroad of New Jersey.  
 Central Vermont.  
 Champaign & Havana.  
 Charleston & Western Carolina.  
 Chattahoochee Valley.  
 Chattanooga, Rome & Columbus.  
 Chattanooga Southern.  
 Chesapeake & Ohio.  
 Chesapeake, Ohio & South-Western.  
 Chesapeake & Western.  
 Chestnut Ridge.  
 Chicago, Burlington & Kansas City.  
 Chicago, Burlington & Northern.  
 Chicago, Burlington & Quincy.  
 Chicago, Cincinnati & Louisville.  
 Chicago, Indiana & Southern.  
 Chicago, Fort Madison & Des Moines.  
 Chicago Great Western.  
 Chicago, Indianapolis & Louisville.  
 Chicago Junction.  
 Chicago, Kalamazoo & Saginaw.  
 Chicago, Lake Shore & Eastern.  
 Chicago, Milwaukee & Gary.  
 Chicago, Milwaukee & Puget Sound.  
 Chicago, Milwaukee & St. Paul.  
 Chicago, New York & Boston Refrigerator Co.  
 Chicago, Peoria & St. Louis.  
 Chicago Refrigerator Car Co.  
 Chicago, Rock Island & Pacific.  
 Chicago Short Line.  
 Chicago, St. Louis & Pittsburgh.  
 Chicago, St. Paul, Minneapolis & Omaha.  
 Chicago Terminal Transfer.  
 Chicago Union Transfer.  
 Chicago, West Pullman & Southern.  
 Chicago & Alton.  
 Chicago & Calumet River.  
 Chicago & Eastern Illinois.  
 Chicago & Erie.  
 Chicago & Illinois Western.  
 Chicago & Iowa.  
 Chicago & Milwaukee Electric.  
 Chicago & North Western.  
 Chicago & South Bend.  
 Chicago & Western Indiana and Belt Railway.  
 Chihuahua & Pacific.  
 Choctaw, Oklahoma & Gulf.  
 Cincinnati, Hamilton & Dayton.  
 Cincinnati, Selma & Mobile.  
 Cincinnati Northern.  
 Cincinnati Southern.  
 Cincinnati, New Orleans & Texas Pacific.  
 Cleveland, Akron & Columbus.  
 Cleveland, Cincinnati, Chicago & St. Louis.

- Cleveland & Marietta.  
 Cleveland, Canton & Southern.  
 Cleveland, Lorain & Wheeling.  
 Cleveland Provision Co.  
 Cleveland Terminal & Valley.  
 Clove Branch.  
 Coal & Coke.  
 Cold Blast Refrigerator Transit Co.  
 Cold Blast Transportation Co.  
 Colorado & Southern.  
 Colorado & South-Eastern.  
 Colorado & Wyoming.  
 Colorado Midland.  
 Colorado Springs & Cripple Creek District.  
 Columbia & Puget Sound.  
 Connecticut River.  
 Consolidated Cattle Car Co.  
 Consolidated Rolling Stock Co.  
 Continental Fruit Express.  
 Cornwall.  
 Cornwall & Lebanon.  
 Corsicana Cotton Oil Co.  
 Corvallis & Eastern.  
 Craig Oil Co.  
 Crystal Car Line.  
 Cudahy Refrigerator Line.  
 Cumberland Valley.  
 Cumberland & Pennsylvania.  
 Dairy Shippers' Despatch.  
 Delaware, Lackawanna & Western.  
 Delaware River & Union.  
 Delaware, Susquehanna & Schuylkill.  
 Delaware & Hudson Co.  
 Delaware & Northern.  
 Delray Connecting.  
 Denver & Inter-Mountain.  
 Denver & Rio Grande.  
 Denver, Laramie & Northwestern.  
 Denver, Northwestern & Pacific.  
 Detroit, Bay City & Western.  
 Detroit, Toledo & Milwaukee.  
 Detroit & Lima Northern.  
 Detroit & Mackinac.  
 Des Moines & Fort Dodge.  
 Des Moines & Northern.  
 Dewey Portland Cement Co.  
 Diamond Alkali Co.  
 Dominion Atlantic.  
 Doniphan, Kensett & Searcy.  
 Doud Stock Car Co.  
 Dry Fork.  
 Du Queen & Eastern.  
 Duluth & Iron Range.  
 Duluth, Missabe & Northern.  
 Duluth, Rainy Lake & Winnipeg.  
 Duluth, South Shore & Atlantic.  
 Eagle Oil Co.  
 Elgin, Joliet & Eastern.  
 Elizabeth River.  
 Elkin & Allegheny.  
 Elmira, Cortland & Northern.  
 El Paso & Southwestern.  
 Empire Oil Works.  
 Erie.  
 Erie & Michigan Ry. & Nav. Co.  
 Erie & Wyoming Valley.  
 Esquimalt & Nanaimo.  
 Evansville & Terre Haute.  
 Express Coal Line.  
 Fairbank Co., The N. K.  
 Fall Brook.  
 Federal Creosoting Co.  
 Fernwood & Gulf.  
 Findlay, Fort Wayne & Western.  
 Fitchburg.  
 Florence & Cripple Creek.  
 Florida Central.  
 Florida East Coast.  
 Fort Smith, Subiaco & Eastern.  
 Fort Smith & Western.  
 Fort Worth Belt.  
 Fort Worth & Denver City.  
 Freedom Oil Works.  
 Gainesville & Northwestern.  
 Galveston, Harrisburg & San Antonio.  
 Geneva, Ithaca & Sayre.  
 George's Creek & Cumberland.  
 Georgia.  
 Georgia, Florida & Alabama.  
 Georgia Southern & Florida.  
 German-American Car Co.

- German-American Refrigerator Ex-  
 press.  
 German-American Tank Line.  
 Gilmore & Pittsburgh.  
 Globe Soap Co.  
 Golden Circle.  
 Goodwin Car Co.  
 Grand Rapids & Indiana.  
 Grand Trunk.  
 Grand Trunk Pacific.  
 Graver Tank Works, Wm.  
 Great Northern Railway Line.  
 Great Western Oil Refg. Co.  
 Green Bay & Western.  
 Greenville, Spartanburg & Ander-  
 son.  
 Groveton, Lufkin & Northern.  
 Gulf & Sabine River.  
 Gulf & Ship Island.  
 Gulf, Colorado & Santa Fe.  
 Gulf Refining Co.  
 Gulf, Western Texas & Pacific.  
 Guyton, W. A. & Co.  
 Haggenbeck-Wallace Shows.  
 Hannibal & St. Joseph.  
 Hartford & Connecticut Western.  
 Hecla Belt Line.  
 Heinz, H. J., & Co.  
 Higgins Oil & Fuel Co.  
 Higley Co. Refrigerator Line.  
 Hocking Valley.  
 Housatonic.  
 Houston East & West Texas.  
 Houston & Texas Central.  
 Houston Packing Co.  
 Huntington & Broad Top Mountain.  
 Hutchinson & Southern.  
 Idaho & Washington Northern.  
 Illinois Central.  
 Illinois Northern.  
 Illinois Southern.  
 Illinois Terminal.  
 Illinois Traction System.  
 Imperial Oil Co. Ltd.  
 Indiana, Bloomington & Western.  
 Indiana Harbor.  
 Indiana Pipe Line & Refining Co.  
 Indiana Refining Co.  
 Indianapolis, Decatur & Western.  
 Intercolonial of Canada.  
 International & Great Northern.  
 Inter-Urban.  
 Interstate.  
 Iowa Central.  
 Iron Car Express Coal Line.  
 Jacksonville & St. Louis.  
 Jacob Dold Packing Co.  
 Jamison Coal & Coke Co.  
 Kalamazoo, Lake Shore & Chicago.  
 Kanawha & Michigan.  
 Kansas City, Fort Scott & Mem-  
 phis.  
 Kansas City, St. Joseph & Council  
 Bluffs.  
 Kansas City, Memphis & Birming-  
 ham.  
 Kansas City, Mexico & Orient.  
 Kansas City Southern.  
 Kansas City Terminal.  
 Kentucky Refining Co.  
 Keokuk & Western.  
 Keystone Palace Horse Car Co.  
 Kilpatrick Bros. & Collins Contract-  
 ing Co.  
 Knapp, I. N.  
 Lackawanna Coal & Coke Co.  
 Lackawanna Iron & Steel Co.  
 Lackawanna Steel Co.  
 Lake Carrier's Oil Co.  
 Lake Champlain & Moriah.  
 Lake Erie & Detroit River.  
 Lake Erie & Western.  
 Lake Shore & Michigan Southern.  
 Lake Superior & Ishpeming.  
 Lake Terminal.  
 Las Vegas & Tonopah.  
 Leavenworth, Kansas & Western.  
 Leetonia.  
 Lehigh & Hudson River.  
 Lehigh & New England.  
 Lehigh Valley.  
 Lexington & Eastern.  
 Linde Air Products Co.  
 Lipe, F. W.

- Litchfield & Madison.  
 Litchfield, Carrollton & Western.  
 Live Poultry Transportation Co.  
 Long Island.  
 Louisiana & Arkansas.  
 Louisiana & Northwest.  
 Louisiana & Pacific.  
 Louisiana Railway & Navigation Co.  
 Louisiana Western.  
 Louisville Cotton Oil Co.  
 Louisville & Nashville.  
 Louisville, New Orleans & Texas.  
 Louisville Soap Co.  
 Louisville, St. Louis & Texas.  
 Louisville & Northwest.  
 Louisville & St. Louis.  
 Lutz & Schramm Co.  
 McCloud River.  
 Macon & Birmingham.  
 Madison, Alton & Chicago.  
 Mahoning Valley.  
 Maine Central.  
 Manhattan Oil Co.  
 Manistee & Grand Rapids.  
 Manistee & North-Eastern.  
 Manitoba & North-Western Ry. of  
     Canada.  
 Manufacturers' Junction.  
 Manufacturers Ry. of St. Louis.  
 Marietta, Columbus & Cleveland.  
 Marquette & Southeastern.  
 Maryland & Pennsylvania.  
 Martin, John C.  
 Marshalltown & Dakota.  
 Mason City & Fort Dodge.  
 Mather Stock Car Co.  
 Mercer Valley.  
 Merchants & Planters Oil Co.  
 Merchants Despatch Transportation  
     Co.  
 Mexican Central.  
 Mexican International.  
 Mexican Northern.  
 Michigan Ammonia Works.  
 Michigan Central.  
 Midland Continental.  
 Midland Valley.  
 Midland Valley Tank Line.  
 Midland Terminal.  
 Miller's Sons' Co., A. D.  
 Milwaukee, Lake Shore & Western.  
 Milwaukee Refrigerator Transit &  
     Car Co.  
 Mineral Point Zinc Co.  
 Minneapolis, St. Paul & Sault Ste.  
     Marie.  
 Minneapolis & St. Louis.  
 Minnesota & International.  
 Mississippi Central.  
 Mississippi River & Bonne Terre.  
 Mississippi River, Hamburg &  
     Western.  
 Missouri Pacific.  
 Missouri & North Arkansas.  
 Missouri, Kansas & Texas.  
 Mobile & Birmingham.  
 Mobile & Ohio.  
 Mobile, Jackson & Kansas City.  
 Monongahela Connecting.  
 Monongahela River Consol. Coal &  
     Coke Co.  
 Montana Union.  
 Montpelier & Wells River.  
 Monte Cristo.  
 Montour.  
 Montpelier & Wells River.  
 Mooney Car Line Co.  
 Morgan's Louisiana & Texas Rail-  
     road & Steamship Co.  
 Morganstown & Kingwood.  
 Morrissey, Fernie & Michel.  
 Morton-Gregson Car Lines.  
 Munising.  
 Nacozari.  
 Nashville, Chattanooga & St. Louis.  
 National Ammonia Co.  
 National Car Co.  
 National Car Line.  
 National Rys. of Mexico.  
 National Rolling Stock Co.  
 Nelson Morris & Co.  
 Nevada Copper Belt.  
 Nevada Northern.  
 New England Coal & Coke Co.

- Newburgh & South Shore.  
 Newburgh, Dutchess & Connecticut.  
 New Orleans Great Northern.  
 New Orleans, Mobile & Chicago.  
 New Orleans, Natalbany & Nat-  
 chez.  
 New Orleans & Northeastern.  
 Newport News & Mississippi Val-  
 ley.  
 New River & Pocahontas Consoli-  
 dated Coal Co.  
 New York Central & Hudson River,  
 New York & Northern.  
 New York & Ottawa.  
 New York, Chicago & St. Louis.  
 New York, New Haven & Hartford.  
 New York, Ontario & Western.  
 New York, Pennsylvania & Ohio.  
 New York, Philadelphia & Norfolk.  
 New York, Providence & Boston.  
 New York & New England.  
 New York, Susquehanna & West-  
 ern.  
 New York, Texas & Mexican.  
 Norfolk Southern.  
 Norfolk & Carolina.  
 Norfolk & Portsmouth Belt Line.  
 Norfolk & Western.  
 Northern Central.  
 Northern Pacific.  
 Northwestern Ohio Ry. & Power  
 Co.  
 Ocala Northern.  
 Ocilla Southern.  
 Old Colony.  
 Old Dominion Copper Mining &  
 Smelting Co.  
 Ogdensburg & Lake Champlain.  
 Ohio Southern.  
 Ohio & Mississippi.  
 Oil Seeds Co.  
 Omaha & St. Louis.  
 Oregon Electric.  
 Oregon Railroad & Navigation Co.  
 Oregon Short Line.  
 Overland Refrigerator Express.  
 Owasco River.  
 Pacific Electric.  
 Pacific Fruit Express Co.  
 Paragon Refining Co.  
 Parral & Durango.  
 Penn Gas Coal Co.  
 Pennsylvania Coal & Coke Corpora-  
 tion.  
 Pennsylvania Co.  
 Pennsylvania, Poughkeepsie & Bos-  
 ton.  
 Pennsylvania Railroad.  
 Pennsylvania Tank Line.  
 Pennsylvania Terminal.  
 Pennsylvania & North-Western.  
 Peoria, Decatur & Evansville.  
 Pere Marquette.  
 Petersburg.  
 Philadelphia & Reading.  
 Philadelphia, Baltimore & Washing-  
 ton.  
 Pierce Fordyce Oil Assn.  
 Pittsburgh, Akron & Western.  
 Pittsburgh, Allegheny & McKee's  
 Rocks.  
 Pittsburgh, Chartiers & Youghio-  
 gheny.  
 Pittsburgh, Cincinnati, Chicago &  
 St. Louis.  
 Pittsburgh Coal Co.  
 Pittsburg, Shawmut & Northern.  
 Pittsburg Provision & Packing Co.  
 Pittsburgh & Buffalo Co.  
 Pittsburgh & Eastern.  
 Pittsburgh & Lake Erie.  
 Pittsburgh & Ohio Valley.  
 Pittsburgh & Susquehanna.  
 Pittsburgh & Western.  
 Plant System.  
 Pontiac, Oxford & Northern.  
 Portland & Rumford Falls.  
 Potato Creek.  
 Prescott & Eastern.  
 Produce Shippers' Despatch.  
 Producers' Pipe Line Co.  
 Providence & Worcester.  
 Provision Dealers' Despatch.  
 Pullman.

Quanah, Acme & Pacific.  
 Quebec & Lake St. John.  
 Quebec, Montreal & Southern.  
 Quincy, Omaha & Kansas City.  
 Raleigh & Gaston.  
 Ray & Gila Valley.  
 Rio Grande, Sierra Madre & Pacific.  
 Richmond, Fredericksburg & Potomac.  
 Ringling Bros.  
 Rio Grande Western.  
 Rock Island & Peoria.  
 Rome, Watertown & Ogdensburg.  
 Rutland.  
 Saginaw Valley & St. Louis.  
 Saint Clair Terminal.  
 San Antonio & Aransas Pass.  
 San Pedro, Los Angeles & Salt Lake.  
 Santa Fe Central.  
 Santa Fe, Prescott & Phoenix.  
 Santa Fe Refrigerator Despatch.  
 Scioto Valley.  
 Seaboard Air Line.  
 Seattle & International.  
 Shenandoah Valley.  
 Sherman, Shreveport & Southern.  
 Shippers' Refrigerator Car Co.  
 Shreveport Creosoting Co.  
 Sierra Ry. Co. of California.  
 Sinclair & Co., Ltd., T. M.  
 Sonora.  
 South Buffalo.  
 South Carolina.  
 South-Eastern Line.  
 South Florida.  
 Southwestern of Arizona.  
 Southern.  
 Southern Central.  
 Southern Freight Line.  
 Southern Indiana.  
 Southern Iowa Traction Co.  
 Southern Iron Car Line.  
 Southern Oil Co.  
 Southern Pacific (Pacific System).  
 Southern Pacific R. R. Co. of Mexico.

Spokane & Inland Empire.  
 Spokane Falls & Northern.  
 Spokane International.  
 Spokane, Portland & Seattle.  
 St. Joseph, South Bend & Southern.  
 St. Joseph & Grand Island.  
 St. Louis, Brownsville & Mexico.  
 St. Louis Car Co. Line.  
 St. Louis, Chicago & St. Paul.  
 St. Louis Dressed Beef & Provision Co.  
 St. Louis, Kansas City & Colorado.  
 St. Louis, Keokuk & North-Western.  
 St. Louis Merchants Bridge Terminal.  
 St. Louis, Peoria & Northern.  
 St. Louis Refrigerator Car Co.  
 St. Louis, Rocky Mountain & Pacific.  
 St. Louis Southwestern.  
 St. Louis Southwestern Railway of Texas.  
 St. Louis Transfer.  
 St. Louis, Troy & Eastern.  
 St. Louis, Watkins & Gulf.  
 St. Louis & Hannibal.  
 St. Louis & O'Fallon.  
 St. Louis & San Francisco.  
 St. Paul & Duluth.  
 Staten Island Rapid Transit.  
 Stephenville North & South Texas.  
 Street's Western Stable Car Line.  
 Susquehanna & New York.  
 Swift Refrigerator Transportation Co.  
 Sydney & Louisburg.  
 Tacoma Eastern.  
 Tehuantepec National.  
 Temiskaming & Northern Ontario.  
 Tennessee, Alabama & Georgia.  
 Tennessee Central.  
 Tennessee Copper Co.  
 Terminal Railroad Association of St. Louis.  
 Texas & New Orleans.  
 Texas Brewing Co.

Texas Central.	Vicksburg, Shreveport & Pacific.
Texas Company.	Vinton Colliery Co.
Texas Pacific.	Virginia.
Tionesta Valley.	Virginia & Southwestern.
Toledo, Cincinnati & St. Louis.	Wabash Railway.
Toledo, Columbus & Cincinnati.	Walworth & Neville Mfg. Co.
Toledo, Peoria & Western.	Washington Coal & Coke Co.
Toledo, St. Louis & Western.	Washington Southern.
Toledo Terminal.	Waterloo, Cedar Falls & Northern.
Toledo & Ohio Central.	Waters Pierce Oil Co.
Toledo & Ohio Central Extension.	Wheeling & Lake Erie.
Toledo & Western.	Western Car Co.
Tonopah & Goldfield.	Western Live Stock Express.
Tonopah & Tidewater.	Western Maryland.
Toronto, Gray & Bruce.	Western Pacific.
Toronto, Hamilton & Buffalo.	Western Railway of Alabama.
Tremont & Gulf.	Western New York & Pennsylvania.
Trinity & Brazos Valley.	Western Rolling Stock & Equip-
Troy & Boston.	ment Co.
Tyler South-Eastern.	West Jersey & Sea Shore.
Union.	Westmoreland Coal Co.
Union Oil Co. of California.	West Shore.
Union Pacific.	West Side Belt.
Union Refrigerator Transit Co.	West Virginia Central & Pittsburg.
Union Sand & Material Co.	Wiggins Ferry Co.
Union Stock Yards & Transit Co.	Williamsville, Greenville & St.
of Chicago.	Louis.
Union Stock Yards Co. of Omaha.	Wisconsin Central.
Union Tank Line.	Wisconsin & Northern.
United Coal Co.	Yellowstone Park.
United States Equipment Co.	Zanesville & Ohio River.
Vandalia.	Zanesville & Western.
Vera Cruz & Pacific.	

## APPENDIX.

### CODE OF RULES

Governing the Condition of, and Repairs to, Passenger Equipment Cars  
in Interchange.

#### PREFACE.

These rules make car owners responsible for, and therefore chargeable with, the repairs to their cars necessitated by ordinary wear and tear in fair service, so that defect cards will not be required for any defects thus arising.

Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident, and for improper repairs made by them, and they should make proper repairs at their own expense, or issue defect card covering all such damage or improper repairs.

All inspection of passenger cars for interchange will be made in accordance with the following rules:

1. Each Railway Company shall give to foreign cars, while on its line, THE SAME CARE AS TO OILING, PACKING, INSPECTION AND ADJUSTING BRAKES THAT IT GIVES ITS OWN CARS, except in case of cars on which work is done under special agreement existing between the company owning the cars and the road operating the same.

2. The expenses of maintenance of passenger equipment operated in interchange or line service shall be divided into three classes, namely:

(a) Owner's defects.

(b) Delivering Company's defects.

(c) Line expenses proratable against the roads comprising the lines on a mileage basis.

3. (a) Owner's defects are those due to ordinary wear and tear.

(b) Delivering company's defects are those due to unfair usage, derailment or accident. Delivering company is solely responsible to car owners for any improper repairs made by it.

(c) Line expenses shall consist of the expense of terminal cleaning. Oil lighting (oil, chimneys, wicks, burners, shades).

Gas lighting (gas, mantles, tips, domes, globes, bulbs, bowls).

Electric lighting (fuses, incandescent bulbs, charging current, shades and belts).

Heating (terminal heating and coal furnished for individual car heaters en route).

Candles and broken glass.

4. The railway making the repairs for the defects not proratable against the line is privileged to bill the car owner for these repairs, unless there is evidence to indicate that the damage was occasioned by unfair handling on the part of the delivering company.

5. Information as to mileage made by cars must be furnished promptly on request of owners by railways over which cars are run.

6. Each operating line at interest may charge one journal bearing only per journal per trip. The following information must be specified on billing repair card or on the bill itself:

Whether solid, filled or any other kind, removed and replaced.

Length of journal.

Box number.

7. No labor charge shall be made for applying brake shoes, journal bearings, hose (air, steam or signal incandescent bulbs, gas domes, gas globes, gas bulbs, gas bowls, gas pillars, mantles, tips, filling lamps, charging batteries, gasing tanks, icing or coaling cars.

8. No credit to be allowed for burned-out incandescent bulbs, burned-out fuses or scrap brake shoes removed.

**NOTE.**—Steel back brake shoes not to be removed if over one-half ( $\frac{1}{2}$ ) inch thick; gray iron shoes not to be removed if over three-quarters ( $\frac{3}{4}$ ) inch thick.

9. Loss of metal from tires of steel-tired wheels, caused by flat sliding, is chargeable to the company on whose road the damage occurs.

**NOTE.**—Loss of service metal from steel-tired wheels as a result of sliding to be measured from point where slide begins. One-sixteenth ( $\frac{1}{16}$ ) inch of metal to be allowed for flat spots under two and one-half ( $2\frac{1}{2}$ ) inches long and one-eighth ( $\frac{1}{8}$ ) inch of metal to be allowed for flat spots two and one-half ( $2\frac{1}{2}$ ) to three and one-half ( $3\frac{1}{2}$ ) inches in length, both inclusive.

10. (a) Axles broken under fair usage or having journals one-half ( $\frac{1}{2}$ ) inch or more under the standard for car (except for three and three-quarters by seven ( $3\frac{3}{4}$  by 7) inches) which will be condemned at three and one-half ( $3\frac{1}{2}$ ) inches may be renewed at the expense of the car owner. Size of journal should be stenciled on truck.

(b) Cut journals, axles bent or broken or rendered unsafe by unfair usage, derailment or accident, shall be renewed at the expense of the railway on whose line the damage occurs.

(c) Where necessary to true-up axles in cases of cut journals, where the journal is reduced below the limit as prescribed in Rule 10-a, axle must be changed at the expense of company cutting journal.

11. (a) Charge for terminal car heating to be 25 cents per day of twenty-four hours, or less.

(b) Cars lying at stations for over forty-eight hours, expense of heating to be borne by railway in whose possession cars may be.

12. (a) Brakes must be in perfect working order. Cylinders, triple valves and slack adjusters must have been cleaned and oiled within six (6) months, and in case of cars equipped with high-speed brakes, triple and high-speed valves must be cleaned every three (3) months and date of last cleaning and oiling stenciled on brake cylinder and triple valve with white paint.

(b) The adjustment of piston travel based on not less than seventy (70) pounds initial pressure must not be less than five (5) inches nor more than eight (8) inches.

On electrically lighted cars equipped with storage batteries or axle device, furnished to foreign roads, where no agreement is made, a charge of 75 cents per day shall be made for the use of electrical equipment.

For repairs to electric lighting equipment on cars in interchange or leased cars, the instructions issued by the manufacturer of the apparatus should be strictly adhered to. In the absence of any agreement, the material furnished and applied must be of the manufacturer's make.

#### DEFECTS IN WHEELS — OWNERS RESPONSIBLE

13. (a) Loose wheels.

(b) Variation from gauge (see Fig. 8 for wheels cast prior to M. C. B. standard tread and flange adopted in 1907, and Fig. 9 for wheels cast after January 1, 1908).

#### WHEELS — CAST-IRON.

14. (a) Shelled out; wheels with defective treads on account of pieces shelling out; if the spots are over one (1) inch or so numerous as to endanger the safety of the wheel.

(b) Tread worn hollow; if tread is worn hollow  $\frac{1}{8}$  inch or over.

(c) Worn flanges; flanges having flat vertical surfaces extending  $\frac{3}{8}$  inch or more from tread, or, flanges 1 inch thick or less, gauged at a point  $\frac{3}{8}$  inch above tread.

(d) Gauge for condemning worn flanges of cast-iron wheels under passenger cars to be the same as is used for condemning worn flanges of cast-iron wheels under freight cars of 80,000 pounds capacity or over.

(e) Burst; if wheel is cracked from wheel fit outward by pressure from axles.

(f) Flange, rim, tread, plate brackets or any other part of wheel, either cracked, chipped or broken under fair usage.

#### WHEELS — STEEL-TIRED.

15. (a) Loose, broken or cracked hubs, plates, bolts, retaining ring or tire, occurring under fair usage.

(b) Worn flange or tire; with flange 15-16 inch thick or less or

having flat vertical spot extending 1 inch or more from tread, or with tire thinner than shown in Figs. 1, 2, 3 and 4.

(c) Gauge for condemning worn flanges of steel and steel-tired wheels under passenger cars to be the same as is used for condemning worn flanges of steel and steel-tired wheels under freight cars.

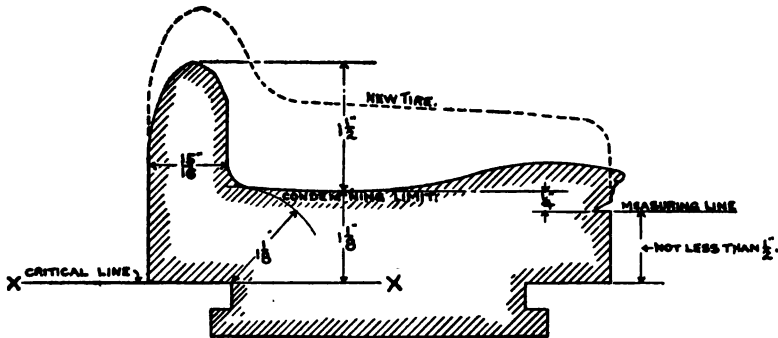


FIG. 1.  
STEEL TIRE.  
RETAINING RING FASTENING.

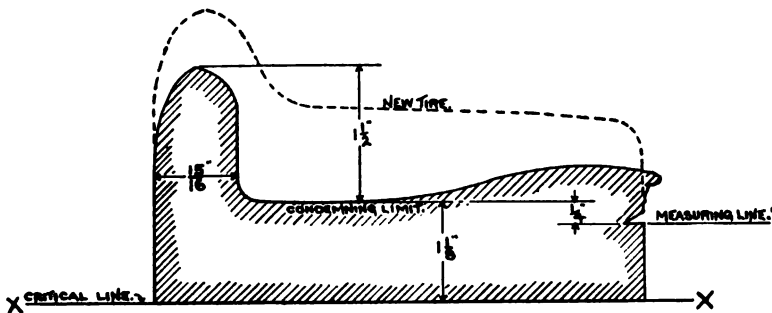


FIG. 2.  
STEEL TIRE.  
SHRINKAGE FASTENING ONLY.



delivering road to bill against it for the number of atmospheres of gas and number of holders at the time car was received.

(Name of Road.)

### GAS CERTIFICATE.

.....  
 Car Number..... Initial.....  
 Number of Atmospheres.....  
 Number of Holders.....  
 Size of Holders.....  
 .....Station, .....19...  
 .....Inspector.

(b) Cars not in line service in interchange requiring holders to be filled, the receiving road shall be charged for the quantity of gas supplied.

(c) For cars stored in shops for repairs the company having car in its possession shall be responsible to the delivering company for the gas in holders. This will apply to sleeping-car companies when cars are in their possession and out of service.

(d) Private or other cars, except regular line cars, when offered in interchange equipped with steam hose couplings that will not couple with the standard on the receiving line, must be changed by receiving company; the hose removed to accompany car and be reapplied when car leaves the line.

18. The depreciation of all passenger equipment cars due to age shall be figured at 3 per cent per annum upon the yearly depreciated value of same, to continue not to exceed 50 per cent of its original value. The above method of depreciation applies equally to either bodies or trucks of such cars. No depreciation shall be allowed on the value of air brakes.

19. This code of rules is to apply to all equipment interchanged in passenger trains.

20. Bills for line charges shall be made and rendered monthly and prices for materials and labor shall be in accordance with accompanying schedule.

21. Air-brake hose applied must be made in accordance with specifications for M. C. B. standard  $1\frac{3}{4}$ -inch hose, and so labeled.

22. This Code of Rules shall take effect October 1, 1913.

### LIST OF PRICES FOR MAINTENANCE OF PASSENGER EQUIPMENT IN INTERCHANGE.

MATERIAL.	NEW.	SECONDHAND.	SCRAP.
Axle, 40,000 lbs. ....	\$10.00	\$ 5.00	\$3.50
Axle, 60,000 lbs. ....	13.00	7.75	4.50
Axle, 80,000 lbs. ....	16.50	10.00	5.75

MATERIAL.	CHARGE.	CREDIT.
Air-brake hose, M. C. B. Standard, 1½", complete with fittings, applied to car.	\$2.00	\$0.80
Air-signal, complete with fittings, applied to car.	1.75	.80
Backs of seats and cushions of passenger cars, either vestibule or common, removing and beating, per car.	.75	
Bell or signal cord and couplings, per car.	.75	
Bolts, nuts and forgings, per lb.	.08	.005
Bowls, gas.	At cost.	
Brake shoes, reinforced, applied, each.	.60	
Bulbs, gas.	At cost.	
Burners, dual wicks, each.	.80	
Burners, round wick, each.	.80	
Candles, per lb.	.18	
Carpets, seats, draperies, etc., parlor and sleeping cars, removing and beating, per car.	1.15	
Chain, per lb.	.04	.005
Chimneys, dual wick, each.	.08	
Chimneys, round wick, each.	.11	
Cleaning baggage cars, each.	.80	
Cleaning common passenger and combination cars, each.	.80	
Cleaning mail cars, each.	1.75	
Cleaning parlor and sleeping cars, exclusive of bedding, per car.	2.50	
Cleaning vestibuled passenger and combination cars inside and outside including vestibules and trucks, each.	1.50	
Coal (including labor), per ton.	6.00	
Domes, gas, each.	.60	
Electric current for charging batteries.	At cost.	
Electric lighting material, incandescent bulbs, fuses, etc.	At cost.	
Gas tips.	At cost.	
Gas mantels.	.40	
Gas, Pintsch, per receiver.	.85	
Glass, per light.	At cost.	
Glass, setting, per light.	.35	
Globes, gas.	At cost.	
Hose, 1½", straight port, steam, complete with fittings, applied to car.	6.50	
Hose, as above, 1½"	6.50	
Hose, as above, 1"	5.00	
Hose, as above, 1½" and 1", credit for fittings.		5.25
Hose, as above, 1", credit for fittings.		4.00
Ice (including labor), per cwt.	.80	
Iron, cast, per lb.	.03	.005
Iron, malleable, per lb.	.04	.005
Journal bearings, brass or bronze, lined or unlined, per lb., applied.	.18	.13
Journal bearings, cast steel or malleable iron back, credit for scrap, per lb.		.02
Journal bearings, filled brass or bronze shell, per lb., applied.	.14	.10
Journal bearings. Weights to be charged and credited as follows:		
For journals—	Lbs.	Lbs.
7" long and over, but not 8" long.	10	6
8" long and over, but not 9" long.	13	8
9" long and over, but not 10" long.	20	12
10" long and over.	25	15
Labor changing wheels, per pair.	\$2.35	
Labor, on lubrication, per hour.	.28	
Labor, on repairs, per hour.	.35	
Loss of metal from steel or steel-tired wheels, per 1-10"	1.50	
Lumber (oak, pine, hickory, poplar and elm), per foot.	.06	
Oil, car, per gallon.	.22	
Oil, coach, per gallon.	.35	
Oil, illuminating, American roads, per gallon.	.11	
Oil, illuminating, Canadian roads, per gallon.	.16	
Removing, turning and replacing same, pair steel-tired wheels.	5.75	
Shades, Acme lamp, each.	.45	
Shades, common lamp, each.	.35	
Steel castings, per lb.	.055	.005
Steel spring (not springs), per lb.	.05	.005
Tallow, per lb.	.06	
Turning steel-tired wheels, per pair.	1.75	
Waste, woolen, per lb.	.125	
Waste, cotton, per lb.	.06	
Wicks, dual, each.	.005	
Wicks, round, each.	.02	
Wheels, labor changing, per pair.	2.35	
Wheels, solid steel or steel-tired new or re-tired.	At cost.	

MATERIAL.	CHARGE.	CREDIT.
Wheels, steel or steel-tired, loss of metal from, per 1-16".....	\$1.50	.....
Wheels, steel-tired, removing, turning and replacing same, per pair.....	5.75	.....
Wheels, steel-tired, turning, per pair.....	1.75	.....

NOTE.—Cost price to be charged for material not in list above.

MATERIAL.	NEW.	AVERAGE CREDIT PRICE.
Wheels, cast, 36".....	\$10.50	\$5.25
Wheels, cast, 33".....	9.00	4.75

## LIST OF RAILROAD COMPANIES.

*The following is a complete list of railroad companies which have given notice of the adoption of the Code of Rules for the interchange of passenger equipment cars:*

Alabama & Vicksburg.	Detroit & Lima Northern.
Arms Palace Horse Car Co.	Doniphan, Kensett & Searcy.
Atlanta & Birmingham Air Line.	El Paso & Southwestern.
Atlantic, Valdosta & Western.	El Paso & Southwestern System.
Baltimore & Ohio.	Erie.
Bangor & Aroostook.	Evansville & Terre Haute.
Boston & Albany.	Evansville & Indianapolis.
Boston & Maine.	Fitchburg.
Burlington, Cedar Rapids & Northern.	Florida East Coast.
Butte, Anaconda & Pacific.	Fort Worth & Denver City.
Cairo, Vincennes & Chicago.	Golden Circle.
Canadian Pacific.	Grand Rapids & Indiana.
Carolina, Clinchfield & Ohio.	Grand Trunk.
Central of Georgia.	Grand Trunk Pacific.
Central Vermont.	Green Bay & Western.
Chesapeake & Ohio.	Hannibal & St. Joseph.
Chicago & Alton.	Hocking Valley.
Chicago & Eastern Illinois.	Hutchinson & Southern.
Chicago & Erie.	Illinois Central.
Chicago & North Western.	Intercolonial Ry. of Canada.
Chicago, Burlington & Kansas City.	Kanawha & Michigan.
Chicago, Burlington & Quincy.	Kansas City Southern.
Chicago, Milwaukee & Puget Sound.	Kansas City, St. Joseph & Council Bluffs.
Chicago, Milwaukee & St. Paul.	Lake Shore & Michigan Southern.
Chicago, Rock Island & Pacific.	Lehigh Valley.
Choctaw, Oklahoma & Gulf.	Louisiana & Arkansas.
Cincinnati, Hamilton & Dayton.	Louisville & Nashville.
Cincinnati, New Orleans & Texas Pacific.	Manitoba & North-Western Railway of Canada.
Cleveland, Cincinnati, Chicago & St. Louis.	Mason City & Fort Dodge.
Cleveland, Lorain & Wheeling.	Michigan Central.
Cleveland Terminal & Valley.	Midland Valley.
Colorado & Southern.	Minneapolis & St. Louis.
Cornwall & Lebanon.	Mississippi River & Bonne Terre.
Delaware, Lackawanna & Western.	Mississippi River, Hamburg & Western.
Denver & Rio Grande.	Missouri Pacific.
Detroit, Toledo & Milwaukee.	Mobile & Birmingham.

Nacozari.	St. Louis, Chicago & St. Paul.
Nashville, Chattanooga & St. Louis.	St. Louis, Iron Mountain & South-
National Rys. of Mexico.	ern.
Nevada Copper Belt.	St. Louis, Kansas City & Colorado.
New Orleans & Northeastern.	St. Louis, Keokuk & North-West-
New York Central & Hudson River.	ern.
New York, Ontario & Western.	St. Louis Southwestern.
New York & Ottawa.	St. Louis Southwestern of Texas.
Northern Pacific.	St. Louis & Hannibal.
Oregon Railway & Navigation Co.	St. Louis & San Francisco.
Oregon Short Line.	Temiskaming & Northern Ontario.
Pennsylvania, Poughkeepsie & Bos-	Tennessee Central.
ton.	Texas & Pacific.
Pere Marquette.	Toledo & Ohio Central.
Philadelphia & Reading.	Toledo & Ohio Central Extension.
Pittsburgh & Lake Erie.	Toledo, Columbus & Cincinnati.
Pittsburgh & Western.	Toledo, St. Louis & Western.
Plant System.	Trinity & Brazos Valley.
Rio Grande, Sierra Madre & Pacific.	Tyler South-Eastern.
Rio Grande Western.	Union Pacific.
Rock Island & Peoria.	United Counties.
San Antonio & Aransas Pass.	Vera Cruz & Pacific.
Seaboard Air Line.	Vicksburg, Shreveport & Pacific.
Sioux City & Northern.	Wabash.
Southern.	Wells Fargo Express Co.
Southern Indiana.	Western Pacific.
Southern Pacific Company.	West Virginia Central & Pittsburgh.
South Florida.	Wheeling & Lake Erie.
Southwestern of Arizona.	Zanesville & Western.
Spokane Falls & Northern.	

## SPECIAL LETTER BALLOT

ON

1. Air Brake Hose Label.
2. Air Brake and Signal Hose Specifications.
3. Air Brake Hose Gasket Specifications.

*To the Representative Members:*

At the Convention at Atlantic City, N. J., on June 18, 1913, the above-named subjects were presented to the Convention through the report of the Committee on Air Brake Hose Specifications and, on motion, were ordered submitted to special letter ballot for adoption, in accordance with Article XI of the Constitution.

1. Air brake hose label.

It seems that a great deal of opposition has arisen to the application of the label which encircles the air-brake hose, and which was adopted as a Standard last year, on account of the increased cost of the application of two labels. On account of this condition of affairs the question of hose label was referred to the Committee on Revision of the Air-brake Hose Specifications, and in its report to the convention in June it recommended for adoption as standard a form of label to circle the hose like that shown herewith. It also recommended that the old label with the calendar on it be eliminated in so far as effecting interchange of cars is concerned, and that its application to hose be left optional with the road wishing to keep a hose record in this manner. It will be noted that the proposed new label contains provision for all the records necessary for keeping track of the hose. The monogram in the center and the shape of the label would indicate that a hose so equipped is an M. C. B. standard hose. In case of its adoption as standard it is proposed that the Secre-

tary procure a copyright to protect the Association against unauthorized persons using it. There will be no charge for its use, as it will belong to the Association.

<b>A.B.C. ROAD</b>		<b>11 — 6</b>	
<b>NAME OF MANUFACTURER</b>	<small>COPYRIGHTED</small>	<b>SERIAL NUMBER</b>	

It is not intended that this proposed label would in any way affect the hose with either the rectangular label or the label that encircles the hose, but it will be a label which is inexpensive to apply, will serve its purpose for keeping track of the hose and at the same time make it unnecessary for the inspector to go between cars to inspect the hose.

The label should be applied around the hose within 6 inches of one end.

In mounting the air hose, the coupling should be applied to the end near which this label is located, so that the drawbar will not obscure the same when an inspector is on the right forward or left back side of the car.

The question to be determined is, are you in favor of the adoption of this label as standard?

## 2. Specifications for air brake and signal hose.

The Committee on Air Brake Hose Specifications submitted the following specifications for air brake and signal hose which, it feels, will be a vast improvement over the present specifications. It advises that there is some good reason for each requirement, and it has had constantly in view a high-grade hose, with due consideration of commercial practicability. The specifications are as follows:

### PROPOSED SPECIFICATION FOR AIR BRAKE AND SIGNAL HOSE.

#### I. MANUFACTURE.

1. All air-brake hose shall be soft and pliable, and not less than four-ply. They shall be made of rubber and cotton fabric, each of the best of

its kind for the purpose. No rubber substitutes or short-fiber cotton to be used.

## II. PHYSICAL PROPERTIES AND TESTS.

Hose will be subjected to the following tests:

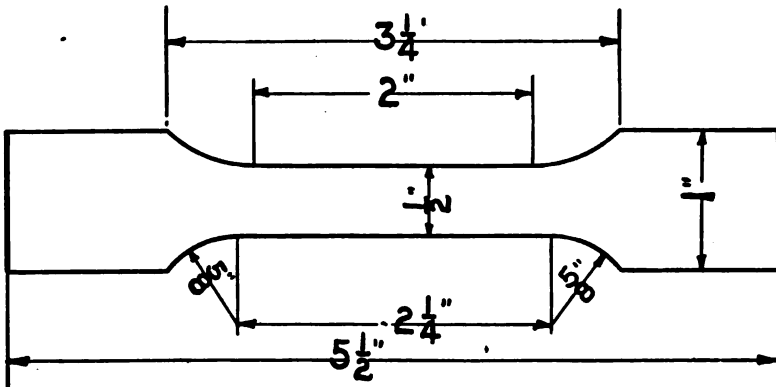
2. **POROSITY TEST.**—A hose will be selected at random and filled with air at 140 pounds pressure for five minutes. At the end of this time the rubber cover will be split with a knife and the hose submerged under water. This test is to determine the porosity of the inner tube. The escape of air must be distinct enough so that the porosity will not be confused with the escape of air which is confined within structure of the hose. This test determines whether or not the lot of two hundred is accepted or rejected.

3. **BURSTING TEST.**—The hose selected for test will have a section 5 inches long cut from one end, and the remaining 17 inches will then be subjected to a hydraulic pressure of 200 pounds per square inch, under which pressure it shall not expand more than  $\frac{3}{4}$  inch in circumference nor develop any small leaks or defects. This section must then stand a hydraulic pressure of 500 pounds per square inch for ten minutes without bursting.

4. **FRICTION TEST.**—A section 1 inch long will be taken from the 5-inch section previously cut off and the quality determined by suspending a 20-pound weight to the separated end, the force being applied radially and the amount of unwinding shall not exceed 8 inches in ten minutes.

5. **STRETCHING TEST.**—Another section 1 inch long will be cut from the remainder of the 5-inch piece, and the rubber tube or lining will be separated from the ply and cut at the lap. Marks 2 inches apart will be placed on the section, and then the section will be quickly stretched until the marks are 10 inches apart and immediately released. The section will then be re-marked as at first and stretched to 10 inches and will remain so stretched 10 minutes. It will then be completely released, and within thirty seconds of the time of releasing the distance between the marks last applied will be measured, and the initial set must not be more than  $\frac{1}{4}$  inch. At the end of ten minutes, distance between the marks will be again measured, and final set must be not more than  $\frac{1}{8}$  inch. The small strips taken from the cover will be subjected to the same test.

6. **TENSILE STRENGTH.**—With a specially designed die of the following dimensions:



## TENSILE SPECIMEN.

Test pieces will be cut from the tube and cover and pulled in a tensile machine with a test speed of 20 inches per minute. After an elongation of at least 10 inches, the inner tube must have a tensile strength of between 800 and 1,200 pounds per square inch, and the cover 700 to 1,100 pounds per square inch.

7. SAMPLING.—For each lot of two hundred one extra hose shall be furnished free of cost.

### 8. III. SIZE AND DIMENSIONS.

#### Length—

	Air-brake Hose.	Air-Signal Hose,
Maximum.....	Inches.	Inches.
Minimum.....	$22\frac{1}{2}$	$22\frac{1}{2}$
	22	22

#### Outside diameter—

Maximum.....	$2\frac{1}{8}$	$1\frac{7}{8}$
Minimum.....	$2\frac{1}{8}$	$1\frac{1}{8}$

#### Inside diameter—

Maximum.....	$1\frac{7}{8}$	$1\frac{7}{8}$
Minimum.....	$1\frac{3}{8}$	$1\frac{1}{8}$

#### Thickness of cap vulcanized on—

Maximum.....	$\frac{3}{32}$	$\frac{3}{32}$
Minimum.....	$\frac{3}{32}$	$\frac{3}{32}$

9. Hose shall be smooth and regular in size throughout its entire length.

## IV. WORKMANSHIP.

10. TUBE.—The tube shall be made either by hand or machine. It shall be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it can not be separated without breaking or splitting the tube. The tube shall be of such a composition and so cured as to successfully meet the requirements of the tests given in Sections 6 and 7, the tubes to be not less than  $\frac{3}{4}$  inch thick at any point.

11. WRAPPING.—The canvas or woven fabric used as a wrapping for the hose is to be made of long-fiber cotton, loosely woven, from 38 to 40 inches in width, and to weigh not less than 20 to 22 ounces per yard, respectively, this to be determined by the following number of threads to the inch:

Warp .....	25 threads per inch.
Filler .....	18 threads per inch.

Tensile strength of single threads:

Warp .....	not under 12 pounds.
Filler .....	not under 9 pounds.

The wrapping shall be frictioned on both sides, and shall have in addition a distinct coating or layer of gum between each ply of wrappings. The canvas wrapping shall be applied on the bias and edges lapped at least  $\frac{1}{2}$  inch. Woven or braided covering should be loose in texture, so that the rubber on either side will be firmly united.

12. COVER.—The cover shall be of the same quality of gum as the tube and shall not be less than  $\frac{1}{8}$  inch thick.

## V. MARKING.

13. SERIAL NUMBER.—Each lot of two hundred or less must bear the manufacturer's serial number, commencing at "1" on the first of the year and continuing consecutively until the end of the year.

14. LABEL.—Each length of hose shall have vulcanized on it the label for air-brake hose of red or white rubber as shown under the specifications for "Label for Air-brake Hose."

## VI. INSPECTION.

15. REJECTION.—If the test hose fails to meet the required test, the lot from which it was taken may be rejected without further examination and returned to the manufacturer.

16. INSPECTION.—Inspection shall be made at destination. If the test hose is satisfactory, the entire lot will be examined and those complying with the specifications will be accepted.

17. **FREIGHT CHARGES.**—Rejected material will be returned to the manufacturer, who shall pay freight charges both ways.

Are you in favor of the adoption of the specifications as standard?

### 3. Air brake hose gasket specifications.

The Committee on Air Brake Hose Specifications submitted specifications for air brake hose gaskets as follows:

## SPECIFICATIONS FOR AIR BRAKE HOSE GASKETS.

### DIMENSIONS.

The dimensions of the gaskets must agree with those adopted by the Association in 1909, and all gaskets shipped must be uniform in size and section.

### MATERIAL DESIRED.

Gaskets ordered under this specification should be made of such a compound that they will be tough and yet have enough elasticity to conform to the requirements for strength and elongation. They should sustain an ultimate load of 100 pounds, and show an elongation of original internal diameter of 350 per cent when tested as described below.

### TESTING.

When the samples for test are received, they will be examined for size and workmanship. The gaskets will be tested in tension in a manner similar to that of the tensile test of a single link of a chain. The half-links used to pull on the gasket will each be provided with a 180 degree fillet of the same diameter at the original inner diameter of the gasket—that is, the two semi-circular fillets of the pulling links will just fill the inside of the gasket.

### REJECTION LIMITS.

If any of the sample gaskets representing a lot should fail under a load of less than 90 pounds, or if the elongation is less than 250 per cent, the entire lot represented by the sample will be rejected. If the tensile strength of any sample tested is more than 125 pounds the lot will be rejected, unless the elongation obtained from such samples is more than 350 per cent.

If the dimensions vary more than 1-64 inch in any way from those adopted as standard, the entire lot will be rejected.

Are you in favor of the adoption of these specifications as standard?

Each representative member is requested to vote by writing "Yes" or "No" opposite the number on each question on the accompanying postal card voting slip, which corresponds with the number on the little ballot, and mail to the Secretary, 390 Old Colony Building, Chicago, Ill.

A vote "Yes" will mean that the subject is to be adopted as standard, as explained in the text, and a vote "No" will mean that it is not to be adopted.

The votes will be counted July 28, 1913, and any votes received at the Secretary's office after that date will be excluded from the count, as required by the Constitution.

All votes must be either "Yes" or "No" to be counted in the result, as no qualified votes will be considered. The number of votes should agree with those shown on the bills for 1913, or the Secretary should be advised of any needed corrections.

JOS. W. TAYLOR,  
*Secretary.*

## LETTER BALLOT VOTING SLIP.

Ballots are to be cast by writing "Yes" or "No" opposite the questions on this card and mailing it to the Secretary. Ballots will be counted July 28, 1913.

1. Air Brake Hose Label. ....
2. Air Brake and Signal Hose Specifications. ....
3. Air Brake Hose Gasket Specifications. ....

Name .....

Title and Road.....

Address.....

## RESULT OF SPECIAL LETTER BALLOT.

*To the Members:*

The special letter ballot on air-brake hose specifications, label and gasket, which closed July 28, 1913, resulted as follows:

No.	SUBJECT.	Yes.	No.	Total.	Necessary to adoption.	Result.
1	Air Brake Hose Label.	1854	124	1978	1319	Adopted.
2	Air Brake Signal Specifications.....	1857	119	1976	1317	"
3	Air Brake Gasket Specifications.....	1853	128	1981	1321	"

JOS. W. TAYLOR,  
Secretary.

## CIRCULAR RELATING TO LETTER BALLOT

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### *To the Members:*

At the Convention of 1913 the following questions were ordered submitted to letter ballot. These questions, in so far as they relate to the Standards, will be found under paragraphs Nos. 1 to 7, and those relating to Recommended Practice in paragraphs A to UU. All references to page and sheet number relate to the 1912 Proceedings.

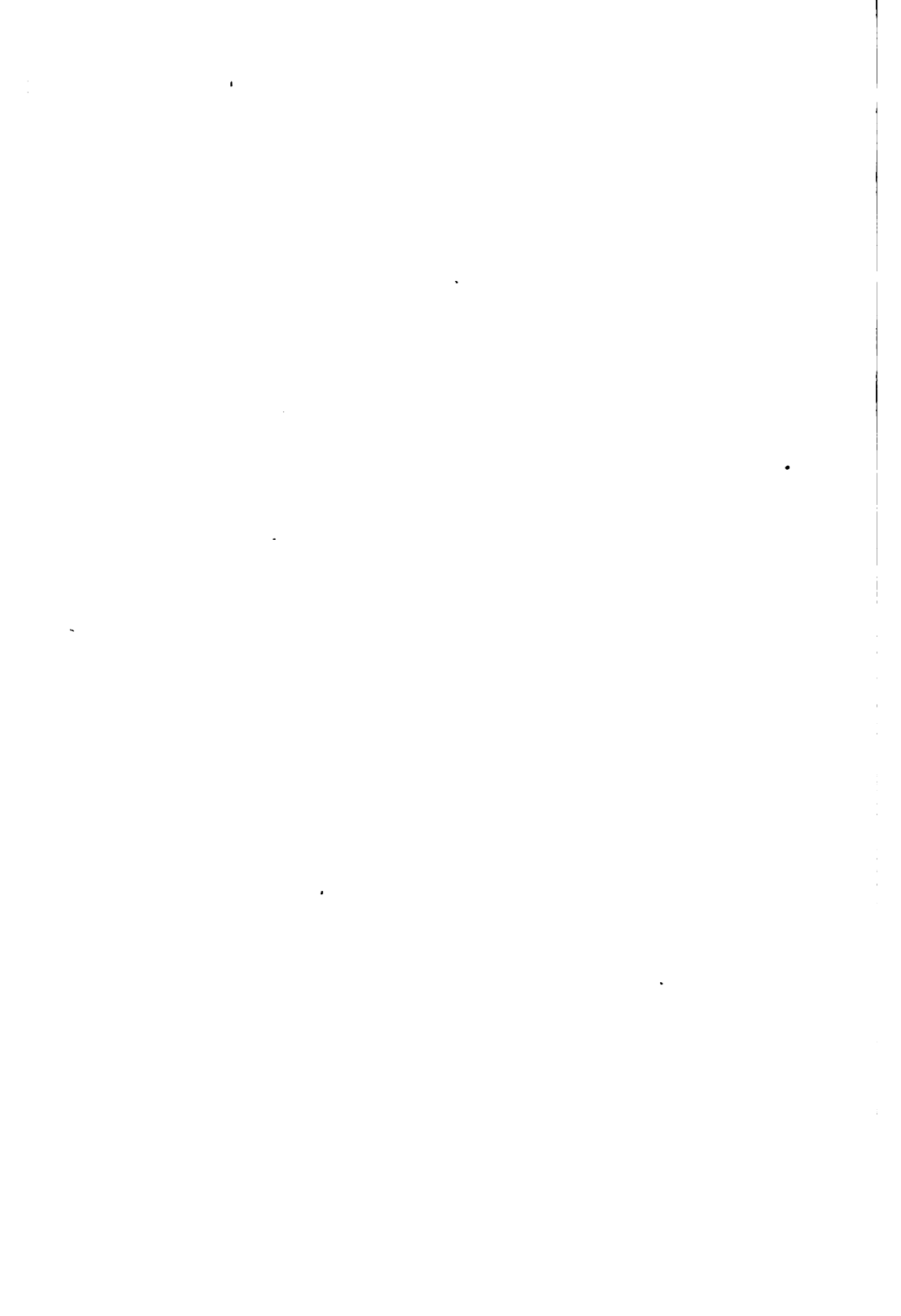
Each member is requested to vote by writing "Yes" or "No" opposite the number or letter on each question on the accompanying slip, which corresponds with the number or letter on the letter ballot, and mail to the Secretary, 390 Old Colony Building, Chicago, Ill.

A vote "Yes" will mean that the subject is to be adopted as a Standard or Recommended Practice, as explained in the text, and a vote "No" will mean that it is not to be adopted.

The votes will be counted September 14, 1913, and any votes received at the Secretary's office after that date will be excluded from the count, as provided by the Constitution.

All votes must be either "Yes" or "No" to be counted in the result, as no qualified votes will be considered. The number of votes should agree with the bills for 1913, or the Secretary should be advised of any needed corrections.





## STANDARDS.

## JOURNAL BOX AND DETAILS.

Pages 678-679, Sheets M. C. B. 7 to 12.

The Committee on Revision of Standards and Recommended Practice calls attention to the fact that the lid for the 80,000 and 100,000 pound boxes does not close tight on the face of the box if dimensions are closely adhered to for the hole in the lug and the hole in the lid, and suggests changing the hole in the lid from  $\frac{3}{32}$  inch, as at present, to  $\frac{5}{16}$  inch.

1. Do you favor the above recommendation?

## AXLES.

Page 683, Sheet M. C. B.— B.

The Committee on Revision of Standards and Recommended Practice suggests advancing Axle E (now a Recommended Practice), with 6 by 11 inch journals, designed to carry 50,000 pounds, to Standard.

2. Do you favor the above recommendation?

## BRAKE BEAMS.

Page 701, Sheet M. C. B.— 17-A.

The Committee on Brake Shoe and Brake Beam Equipment recommends that a spacing of 60 inches be adopted as a standard for brake-beam heads, with a maximum allowable spacing of  $60\frac{1}{8}$  inches and a minimum of  $59\frac{7}{8}$  inches, this spacing to be measured by gauging the inside of the brake-head key lugs.

3. Do you favor the adoption of the above recommendation?

**BRAKE-BEAM GAUGE.**

Page 703, Sheet M. C. B.— 17-A.

The Committee on Brake Shoe and Brake Beam Equipment recommends for adoption as Standard the details of gauges shown on Sheet M. C. B. 17-A, herewith, with the understanding that in case the spacing of 60 inches as standard for brake-beam heads, referred to in Question No. 3, be adopted, the necessary changes will be made in this drawing.

4. Are you in favor of the adoption of this recommendation?

**SPECIFICATIONS FOR M. C. B. AUTOMATIC COUPLERS.**

Page 789.

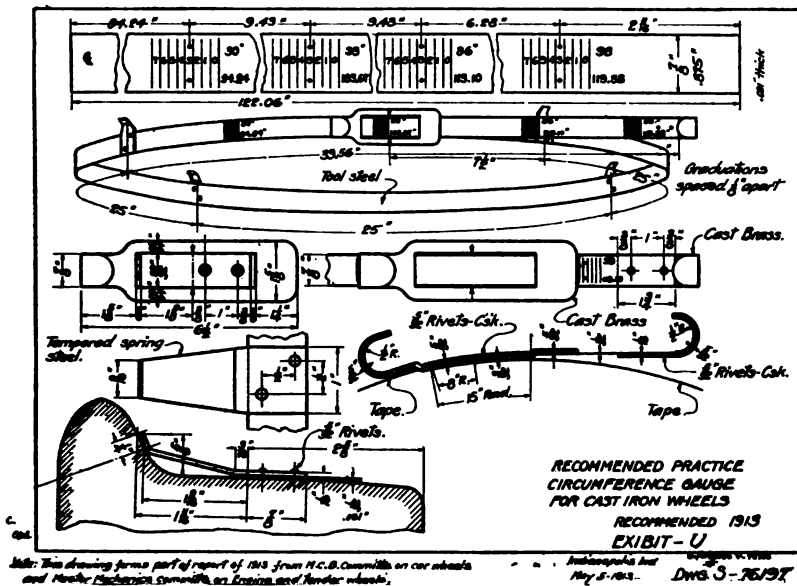
The Coupler and Draft Equipment Committee recommends that the guard-arm test, previously a Standard of the Association, be again made Standard to replace the face test, until some more suitable test can be devised, the latter having proved unsatisfactory.

5. Are you in favor of the adoption of this recommendation?

**WHEEL-CIRCUMFERENCE MEASURE FOR CAST-IRON WHEELS.**

Page 691, Sheet M. C. B.— 16-A.

It having been ascertained that the present standard wheel-circumference gauge for cast-iron wheels is unsatisfactory, the Committee on Car Wheels recommends for adoption as Standard in its stead a new design as shown on Exhibit U, herewith.



6. Are you in favor of the adoption of the above recommendation?

## REVISION OF LOADING RULES.

Pages 812-883.

The Committee on Revision of Rules for Loading Materials suggests a number of minor changes in the present rules to make them clear; also some new rules to cover shipments of materials and machinery that have not heretofore been completely taken care of in this code. They are as follows:

Fig. 32 refers to securing bearing pieces placed on top of the sides of gondola cars for superimposed loads, as referred to in Rule 7. In order to more clearly define what is meant by low side gondola car, it is recommended that 30 inches be the dividing line between low and high

side cars; which is in line with the intent of the rules. Rule 7 should therefore be changed as follows:

"RULE 7.—Lading will not be accepted if placed on top of box or stock cars. If lading is placed on top of wooden cars having sides not more than 30 inches high, and not less than 3 inches thick," and so on.

Rule 10, first paragraph. Fig. 1, page 4.—The question has been raised as to whether the overhang as shown on the right of cut is in conflict with the I. C. C. Safety Appliance regulations by decreasing the prescribed clearance between cars. The opinion of the committee is not unanimous on this point. It is considered by some that the Safety Appliance Regulations in this respect refer to permanent car construction, and not to lading carried on open cars. In order to bring such a load within the clearance limits prescribed for permanent car construction the load would have to be kept  $2\frac{3}{4}$  inches back of the face of the end sill. As there is some doubt as to the existence of a conflict and it is the idea that if the cut is changed it might be construed to govern the loading of a single piece carried on an open car as well, where no idler is provided, we believe it might be properly submitted to the Commission.

RULE 10.—Second paragraph. Change the word "should" to "must," which would make this paragraph read as follows: "If the idler is a flat car of wooden construction, its capacity *must* not be less than that of the carrying cars."

RULE 15.—Paragraph "e." When a part of the load is carried on the sliding pieces of twin or triple loads, of long flexible material, the cars are liable to derail. In order to obtain a better distribution of the load on the bearing pieces, the rule has been changed to read as follows:

"For twin or triple loads of long flexible material, which require more than two sliding pieces in addition to the bearing pieces, weight of lading must not exceed one-half the capacity of the cars on which the permanent bearing pieces are located if load consists of plates or similar lading as per Fig. 43. The total weight must be equally distributed and concentrated as nearly as practicable on the two permanent bearing pieces. Structural material of less flexibility, such as heavy channels and 'I' beams, must conform to Rules 15-A and 15-B, and should be loaded as per Figs. 41 and 42."

RULE 17.—Add "and must conform to Rule 51." This would make the rule read as follows:

"The lading must always be kept clear of the floor and end gates of the cars, both carrying cars and idlers. The amount of this clearance must not be less than four (4) inches and must conform to Rule 51, Fig. 12."

RULE 18.—This rule specifies that a group of cars must not have less than one accessible and operative hand brake for two cars, or two hand

brakes for three to five cars. In order to make this rule agree with the Safety Appliance Laws it should be made to read as follows:

"A group of cars must have at least one accessible and operative hand brake for two or three cars; or two hand brakes for more than three cars. .

Add to the code, Rule 27-A, so that roads desiring to chain together twin or triple loads, suitable cars will be selected when load passes over roads requiring such chains. The new rule should read as follows:

"Cars which are not equipped with permanent safety chains and are so constructed that the necessary chains can not be applied in accordance with Rule 27, are not to be used for twin or triple loads, unless shipment does not go over road employing such chains."

**RULE 27-A.**—Your committee failed to unanimously agree on the provisions of this rule, but the majority recommend that it be reported as above, and attention directed to the significance of the suggestion, so that a wider expression of opinion can be secured. The position is taken by some that it does not seem necessary that the arrangement of chains should be referred to for tandem or triple loads, since it is held that they are unnecessary. On the other hand, probably the majority of the roads have long since regarded it a common practice.

**RULE 30.**—Considerable trouble is experienced with loads of contractors' material, etc., loaded at outlying points which are not properly staked or blocked, and to overcome these conditions this rule should be changed to read as follows:

"Material in open cars requiring special staking or clamping and all material carried on two or three cars, must always be examined by a competent inspector before the cars are moved from the loading point. If an inspector is not stationed at the loading point, the Agent must give notice to the proper authority when the cars are loaded, so proper inspection may be arranged for. The object of such inspection is to see that these regulations have been complied with."

Heading on page 25.—"Lumber loaded on top of short pieces on single cars, as in Fig. 5," should be changed to read, "Long lumber loaded on top of single loads as in Fig. 5." Also change wording on cut to correspond.

Figures 6 and 7, page 27.—On Fig. 6 the maximum overhang is shown as 15 feet. On Fig. 7 the maximum overhang is shown as 18 feet. Rule 43 requires overhang on Figs. 6 and 7 to be governed by restriction in Rule 11, therefore Figs. 6 and 7 should be changed to conform to Rule 43.

**RULE 51.**—On account of the length of cars being increased trouble is experienced with the present clearance of 18 inches from lading to side of car on short curves. The clearance in this rule should be changed from 18 inches to 22 inches, and Fig. 12 made to conform to the rule.

**RULE 67.**—It has been brought to our attention that some Inspectors take the stand that this rule is not intended to govern the loading of any

material, except "cross ties and fence posts." There should be added after "fence posts," "and similar short material." The rule would then read as follows:

"Flat cars loaded with cross ties, fence posts and similar short material, will not be accepted for shipment, unless otherwise agreed."

**RULE 69.**— The manner of fastening the load has been left out of this rule and included in Rules 70 and 71 where it rightly belongs. Also there has been added the manner of securing the binders, when they can not be fastened to the car side. These rules now read as follows:

"**RULE 69.**— If the load extends more than twelve (12) inches above end or end gate at center, each pile must be tied across top by at least two (2) binders. Each binder is to be fastened to each tie in passing over the load (see Rules 70 and 71 for manner of securing binders)."

"**RULE 70.**— When wire is used it must not be less than good one-eighth ( $\frac{1}{8}$ ) inch diameter and but one strand may be used, the wire to be secured to the side of car at least three (3) nails or staples, or to stake pockets, or through holes in top of flange on side of steel cars, or fastened to outside edge of first tie projecting above car side."

"**RULE 71.**— When sapling is used it must be of green timber, split, and not less than one and one-half ( $1\frac{1}{2}$ ) inches wide on the split or flat side. The ends of the sapling must extend at least twelve (12) inches below car side and be securely fastened to each tie with nails in passing over the load."

There is no rule in the code covering the loading of small steel plates and similar material of sizes about 3 feet square. Loads of this kind will cause the car to buckle at the center, if it is not properly distributed over the car floor. The following rule should be added to the code to cover this class of lading.

"**RULE 74-A.**— Small steel plates and similar material loaded in box, stock or gondola cars—the load should be uniformly distributed over the floor of car. In no case should the amount of load placed between the body bolsters and either end of car exceed 15 per cent of the capacity of cars with wood underframing, and 20 per cent of the capacity of cars with steel underframing."

**RULE 81.**— This rule is a continuation of Rule 80, therefore it should be a part of Rule 80, and Rules 81-A, 81-B, 81-C, 81-D and 81-E, should be changed to Rules 81, 81-A, 81-B, 81-C and 81-D.

**RULE 81-D.**— To make this rule conform to Fig. 33-B, after the word "car" in fourth line should be added "On the same side of car two (2) straight-grain hardwood pieces 4 by 6 inches to be securely fastened to car side; the other side supported by three (3) vertical straight-grain hardwood posts 6 by 8 inches in section and of sufficient height that when plates are placed diagonally across the car they will extend from one side across to full width of upright posts."

This rule would then read as follows:

"Plates too wide to be loaded flat on gondola or flat cars, may be loaded diagonally on wooden gondola cars, one side of the load resting on two (2) bearing pieces securely fastened to the floor of car; on the same side of car two (2) straight-grain hardwood pieces 4 by 6 inches to be securely fastened to car side; the other side supported by three (3) vertical straight-grain hardwood posts 6 by 8 inches in section of sufficient height that when plates are placed diagonally across the car they will extend from one side across to full width of upright posts. These posts to be securely bolted to side of car with two (2)  $\frac{7}{8}$ -inch bolts—also secured by one diagonal rod of not less than  $\frac{3}{4}$  inch in diameter, passing through each post within 8 inches of top and through opposite side of car 4 inches above car floor and tied together with 1 by 4 inch hardwood boards, nailed to each vertical post with not less than three (3) ten-penny nails. If the load is made up of two (2) tiers, one on each end of car, the total load must not exceed 75 per cent of the marked capacity of car. If the plates are too long to be loaded in two (2) tiers, they may be loaded at the center of the car in one tier, the load not to exceed 50 per cent of the marked capacity of car. Fig. 33-B shows substantially how bearing pieces and braces are to be made and secured."

**RULE 82.**—Add to the end of this rule the following:

"Where the weight of overhang is not excessive and material very flexible, a 6 by 8 inch post of sufficient length may be bolted to inside of end of car to support overhang in lieu of sliding pieces placed on adjacent car."

This arrangement has been used by shippers for a number of years with entire success, and should be permitted by the rules.

**RULE 85.**—This rule should be changed to include box girders, columns, one-half roof trusses and other similar material loaded on one car. Total length not to exceed 65 feet, overhang not to exceed 16 feet—height and width to conform to Rule 25. These loads are being successfully handled in the mill districts. This rule would then read as follows:

"The method of loading as shown by Figs. 34, 35 and 36 may be made use of to load long lattice girders, box girders, columns, one-half roof trusses and similar material, in lengths not to exceed 65 feet, overhang not to exceed 16 feet—height and width to conform to Rule 25, if the material would be injured if loaded on more than one car. From a point of safety in transit, it is a very undesirable method and should be used only when absolutely necessary."

**RULE 91.**—Change side clearances from 18 inches to 22 inches to conform to changes in Rule 51.

**RULE 93.**—In order to cover triple loads of long flexible material, this rule should be changed to read as follows:

"Long flexible material like plates, etc., which can not be loaded as shown in Fig. 24, must be loaded on two (2) bearing pieces and two (2) or more sliding pieces as in Figs. 41, 42, 43, 43-A and 43-B. The sliding

FIG. 43-A  
RULE 93

LOADING OF LONG FLEXIBLE MATERIAL ON FLAT CARS.

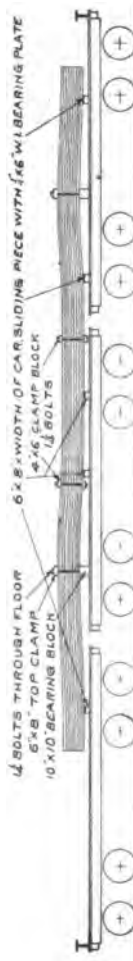
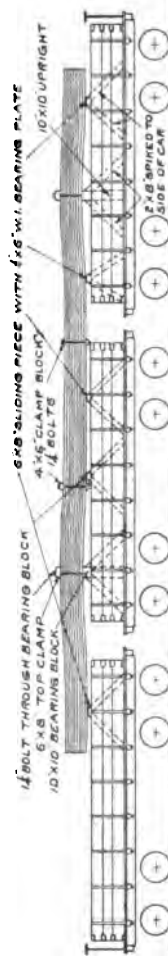


FIG. 43-B  
RULE 93

LOADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS.



pieces must be four (4) inches lower than the bearing pieces and must have flat iron one-half ( $\frac{1}{2}$ ) inch by six (6) inches secured to the upper side, either with spikes or lag screws at each end. These iron pieces which are intended to facilitate curving must extend at least 22 inches beyond each side of the lading and must be coated with grease before the lading is placed upon them. The bearing pieces must be secured to the car and the material clamped together in the same manner as described in Rules 72 and 80 to prevent it from shifting."

**RULE 98.**—To prevent mill rolls and similar material from being loaded crosswise of cars, the last sentence should be changed to read: "Rolling freight must be loaded longitudinally with car and must be chocked to prevent end and side motion."

**RULE 103.**—"All structural material and plates more than sixty (60) feet long, also," should be eliminated, as this class of lading is covered by Rule 93.

**RULE 112.**—The following should be added to this rule:

"Pipe eight (8) feet or less in length, side and end protection must be provided."

**RULE 112-A.**—On account of the difficulty experienced handling pipe where small sizes have been placed inside of larger pipe, a rule prohibiting the practice has been suggested to read as follows, and shown as second and third paragraphs of Rule 112-A:

"Wrought-iron pipe of the smaller sizes, approximately  $1\frac{1}{2}$  inches in diameter and less, should not be loaded inside of larger sizes of pipe, unless below the ends or end gates of cars."

"Wrought-iron pipe of the smaller sizes, approximately  $1\frac{1}{2}$  inches in diameter and less, should not be loaded on top of the larger sizes of pipe, unless the load is below the ends or end gates of cars, except where the smaller pipe is securely tied in bundles."

**RULE 112-B.**—Omit the last sentence in brackets, reading: "(See Rule 112 for wiring and staking)". No staking or wiring is required under this rule.

**RULE 115.**—Omit the last sentence in brackets, reading: "(See Rule 112 for wiring and staking)". No staking or wiring is required under this rule.

**RULE 115-A.**—Add after the word "Pipe" the last word on page 105 the following: "Provided that blocking more than ten (10) inches in height will not be required."

**RULE 116.**—This rule as it now reads is not being complied with. We have revised it to conform to the present method of loading which has proven satisfactory. The new rule reads as follows:

"Blocking of more than ten (10) inches in height will not be required, but on loads of pipe three (3) feet or over in diameter the blocking must be stayed by suitable chocking."

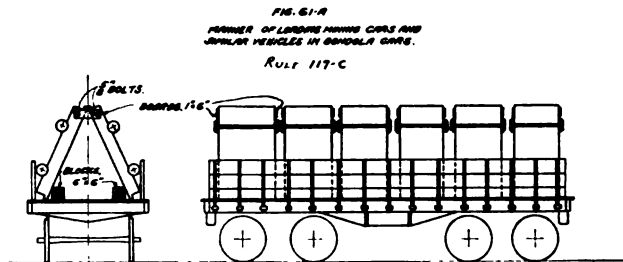
RULE 117-A.—Should be added to the code to cover shipment of galvanized-iron culvert pipe. This rule to read as follows:

“Gondola cars. Galvanized-iron culvert pipe of all sizes, for size and number of stakes to be used see Rules 12 and 112. When mixed sizes are loaded on the same car, the small size pipe when possible, should be placed inside the large size. In loading galvanized pipe Rule 9 must be complied with.”

RULE 117-C.—Should be added to the code to cover shipment of mining cars and similar vehicles. This rule to read as follows:

“Mining cars and similar vehicles; the length of cars being equal to or greater than twice the height of car side, if loaded in gondola cars on ends, the broad side or bottom must be loaded parallel with car side and securely blocked against side of car, the other ends brought together in a cone shape. Each pair of cars or vehicles must be securely fastened together on each side with a board not less than 1 by 6 inches, bolted to each car or vehicle with one  $\frac{5}{8}$ -inch bolt, the entire load to be tied together with four (4) strands, two wrappings of good  $\frac{1}{8}$ -inch diameter wire. The blocking must be of sound timber not less than 6 by 6 inches square. Fig. 61-A shows substantially how the load is to be secured.”

The general instructions on page 108 relative to stakes and braces to protect stone loaded on open cars is not covered by rule number. This should be given No. 118 and the present Rule 118 should be changed to No. 118-A. Also on page 108, first line under the heading “End Protection,” should be changed to read as follows:



“Cars not provided with end stake pockets the necessary, etc.,” and after “or” in first line on page 109, the word “two” should be inserted.

There is no rule covering the loading of mill cinder or slag made in cakes in gondola cars. As this material is lighter than small stone it should be included in Rule 118.

RULE 121.—Last sentence in second paragraph should be changed to read as follows:

"End blocking to be not less than 6 inches in height, bolted to car floor and securely cleated." Fig. 64-B should be changed to conform to the above change in the rule. Four (4) inch blocking is not sufficient to hold boilers and tanks over eight (8) feet in diameter on flat cars.

**RULE 121-A.**—Should be added to the code to cover shipment of smoke stacks on same car with boiler. This rule to read as follows:

"When smoke stacks are shipped on same car with boiler, not less than four (4) 4 by 4 inch stakes should be applied to each side of car, and each pair of stakes tied together with 1 by 5 inch cross braces, nailed to each side of stakes with three (3) ten-penny nails. The smoke stacks should be loaded on top of cross braces and securely wired to them with  $\frac{1}{8}$ -inch diameter wire. The projection of stakes above cross brace should not be less than one-half the diameter of smoke stack."

**RULE 121-B.**—Should be added to the code to cover shipment of engines, machinery and vehicles shipped on their own wheels. This rule to read as follows:

"Engines, machinery and vehicles shipped on their own wheels, should have wheels securely chocked fore and aft and longitudinal sills placed on the inside of wheels and securely fastened to floor of car. Struts should be used to prevent the heavy parts of the engine shifting endwise. One end of the strut should be placed against some strong protection on engine, machine or vehicle—the other end securely fastened to floor of car."

**RULE 122.**—Fig. 64 shows three (3) horizontal tie braces, instead of one (1).

**RULE 122-A.**—The 2 by 4 inch diagonal braces to axle journals now shown in Fig. 66-B and 66-C, should be eliminated and angular chocks 8 inches in height against wheel tread, spiked to car floor, should be substituted.

The heading on page 129, "Rules governing loading material in box or stock cars where the opportunity is provided for inspection, should be changed to read as follows:

**"RULES GOVERNING LOADING MATERIAL IN BOX AND STOCK CARS."**

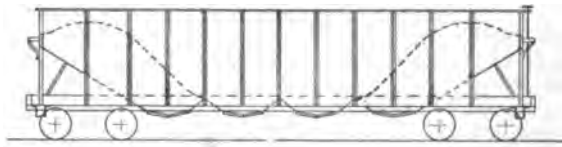
**NOTE.**—Where opportunity is provided the lading should be inspected in transit.

**RULE 123-A.**—A cut with an explanatory note, as covered in this rule, is recommended, to show how iron ore and similar material should be loaded. The rule reads as follows:

"Iron ore and similar material, transported in open cars, should be loaded as shown in Fig. 66-D."

**FIG. 66-D**  
**RULE 123-A**

**MANNER OF LOADING IRON ORE AND SIMILAR MATERIAL.**



**RULE 127.**—To more fully cover the loading of ties, both hewed and sawed, this rule has been changed. Also Rule 127-A should be added to the code to cover sawed ties more than 12 feet in length. These rules should read as follows:

"**RULE 127.**—Hewed ties 8 feet or more in length, or sawed ties of lengths 8 to 12 feet, or similar material which does not conform to Rule 126, may be loaded longitudinally in four (4) tiers, as per Fig. 71, in which case the ends of the tiers next to the end of car and end of ties projecting into the door-ways must rest on bearing pieces not less than 6 inches thick laid crosswise on floor of car. If the length of car is such that ties can not be piled in four (4) tiers, three (3) tiers may be used as shown in Fig. 72, in which case the spaces between the ties must be blocked to prevent any shifting of the middle tier. When loaded in three (3) or four (4) tiers as indicated the door protection strips need not be applied.

"**RULE 127-A.**—Sawed ties more than 12 feet in length (see rules for loading lumber)."

**RULE 132.**—Greased shaftings will shift in ordinary handling, resulting in the end of car being broken out. A paragraph should be added to cover this class of lading, as follows:

"To protect the ends of cars loaded with greased shaftings, boards two and one-half ( $2\frac{1}{2}$ ), inches thick, full width of car and to height of lading, should be securely nailed to end of car."

RULE 133 should be added to the code to cover loading of heavy machinery, such as lathes, planers, boring machines, etc. This rule to read as follows:

"If box cars are used for loading heavy machinery, such as lathes, planers, boring machines, etc., each machine should be blocked by securely nailing to floor of car 2 by 4 inch hardwood strips fore and aft, to prevent shifting endwise."

NEW RULE 134.—Automobiles should have gasoline and water tanks emptied and batteries disconnected. If electric automobiles, remove batteries. Place automobile in car parallel with sides of car. See that front wheels are in line with back wheels. Set brakes. The lower third of tires should be wrapped with at least two thicknesses of good burlap to prevent chafing. Secure each wheel with bands of good strong material (canvas preferred) fastened with 2 by 4 by 12 inch sound wood blocks, placed on each side parallel with wheel, and securely nailed to car floor to prevent bands from pulling loose. Each wheel should be chocked fore and aft with angular chocking one-third the height and two inches wider than wheel. The chocking of each wheel should be tied together with a board on each side of wheel, securely nailed to the chocks. To preserve alignment of the front wheels, small ropes tightly drawn should be fastened from the top of one wheel to the bottom of the other. Burlap should be placed around wheels under rope to protect paint. When shipped without tires, no part of the wheel except center of the rim should come in contact with the chocking. In addition to chocking referred to, an iron band not less than one and one-quarter ( $1\frac{1}{4}$ ) inches wide and not less than 18 gauge in thickness should be passed over top of wheel and securely fastened to chocking.

While it is true your committee has endeavored to solicit suggestions without regard to kind or character of shipments offered for loading, it is rather approaching the belief that a sharp distinction should be made as between a strictly loading code for the safety against shifting and disarrangement of lading, resulting perhaps in overturning and derailling the equipment and the possibility of the load, or a portion thereof, falling off the cars, wrecking other trains, and that of a purely packing and storing proposition, as it might relate to box and other closed cars.

This view of the suggestion suggests itself in the consideration of the shipment of automobiles, but your committee finds some of the roads in the West have prepared rules for the care of such shipments, although perhaps they have been suggested mainly through the traffic departments. However, a rule has been prepared closely following the rules above

alluded to, which is shown above as Rule 134, considering it might at least be reported with this explanation.

7. Are you in favor of the above rules?

## RECOMMENDED PRACTICE.

The Committee on Revision of Standards and Recommended Practice suggests the following assignment of designating symbols for freight equipment:

### CLASSIFICATION OF CARS.

(Recommended Practice.)

Pages 906-913.

"BM"—MILK CAR.—Exclusively for the transportation of milk, being a car for this purpose and fully equipped for handling in passenger trains.

"ES"—ELECTRIC PASSENGER CAR.—For long hauls or suburban service; multiple unit, and fitted with automatic couplings and air brakes. Operating power, storage battery.

"GB"—GONDOLA CAR.—A car with solid bottom, sides and ends, and open on top; suitable for mill trade.

### NOTE TO FOLLOW CLASS "H."

If any of these hopper cars are provided with roof or cover for protection of contents, the letter "R" should be affixed to the regular symbol to designate its special class of service.

"MBE"—COMBINATION, BAGGAGE, MAIL AND EXPRESS CAR. A car having three compartments, each entirely separate from the other for handling its individual class of business.

"MPB"—COMBINATION, BAGGAGE, MAIL AND EXPRESS CAR. A car having an individual compartment, each entirely separate, one suitable for mail, one suitable for baggage, and one suitable for passengers.

"XI"—BOX CAR, INSULATED.—A box car having walls, floor and roof insulated, not equipped with ice bunkers or baskets. This car ordinarily used for transporting vegetables, freight, etc.

"MWX"—BOARDING OUTFIT CARS.—This includes cars used for boarding, sleeping, or cooking purposes in construction and similar work.

SYMBOL.	KIND OF CAR.	DESCRIPTION.
"MWE"	Ballast Spreader and Trimmer.	A car with blades or wings for spreading or trimming ballast.
"MWJ"	Ballast Unloader.	A car equipped with machinery for pulling a plow through cars loaded with ballast.
"MWP"	Pile Driver.	A car equipped with machinery for pile-driving.
"MWK"	Snow Removing Cars.	Cars equipped with any special device for removing snow from between or along side of rails.
"MWM"	Store Supply Car.	A car equipped for handling material to be distributed for railway use.

Following the heading of "General Service Freight Equipment Cars," note to be added, as follows:

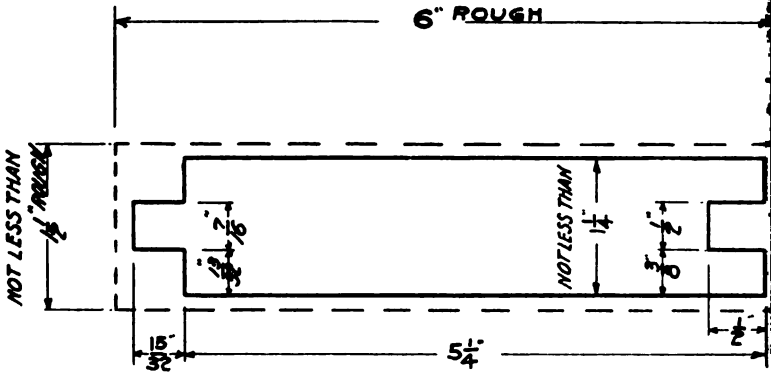
Any of the following classes of equipment having special heating appliances for the protection of commodity against freezing, to be covered by affixing the letter "H" to the designating symbol.

"SH"	Horse Car.	A car specially fitted for the transportation of horses in freight service.
	Weed Burner.	A car equipped with machinery for propelling itself, or otherwise, and burning weeds along the tracks as it proceeds.
	Ditching Car.	A car equipped with machinery for propelling itself, or otherwise, and excavating ditches along the sides of the tracks as it proceeds.
	Rail Saw.	A car equipped with machinery for sawing track rails and similar material.
	Rail Bender.	A car equipped with machinery for bending track rails and similar material.
	Grass Cutter.	A car equipped with machinery for propelling itself, or otherwise, and cutting grass along the tracks as it proceeds.
	Track Layer.	A car equipped with machinery for propelling itself, or otherwise, and laying the track ahead of itself as it proceeds.

A. Do you favor the above recommendation?

### LINING FOR OUTSIDE-FRAMED CARS.

The Committee on Revision of Standards and Recommended Practice recommends establishing as Recommended Practice finish as indicated on the cut below for inside lining for steel frame cars, with outside framing  $1\frac{1}{4}$  inches or over in thickness.



### LINING FOR OUTSIDE FRAMED CARS.

B. Do you favor the above recommendation?

### MARKING OF FREIGHT EQUIPMENT CARS.

Page 804, Sheet M. C. B.—G.

The Committee on Revision of Standards and Recommended Practice recommend that this item be advanced to Standard and Sheet M. C. B.—G be corrected as to location for marking United States Safety Appliances Standard.

C. Do you favor the above recommendation?

### MARKING OF FREIGHT EQUIPMENT CARS.

Page 805, Sheet M. C. B.—G.

The Committee on Revision of Standards and Recommended Practice calls attention to A. R. A. Car Service Rule No. 11,





revised November 20, 1912, in reference to the weighing of freight equipment, and suggests that the revised rule be adopted by this Association and Sheet M. C. B.—G made to conform by omitting the star references on cars. The amended rule is as follows:

(a) Each new car must be weighed separately and the light weight, capacity in pounds,‡ station symbol and the date (month and year) must be marked thereon at the car works, under the supervision of the owner's inspector. The accuracy of the scales used must be certified to by a railroad scale inspector appointed by the car owner.

These provisions to be incorporated in the contract covering the purchase of the equipment.

(b) Wooden and steel underframe cars should be reweighed and remarked at least once every twelve months during the first two years the car is in service, and thereafter once every twenty-four months. All-steel cars should be reweighed and restenciled at least once every thirty-six months. A car must be clean when weighed for marking.

The station symbol and the date (month and year) of each reweighing should be marked the same as provided for new cars in paragraph (a).

(c) When a car is materially changed by repairs, alterations or repainting, it should be reweighed and remarked.

(d) Any car without marking or which has not been reweighed and remarked within the prescribed period should be immediately reweighed and marked. If the car is reweighed at any time and is found to have a variation of over one per cent between the marked and the actual weight, it should be immediately remarked. When a car is remarked the car owner should be notified of the old and of the new weights, with place and date. The proper officer to whom these reports should be made will be designated in "The Official Railway Equipment Register."

(e) Whenever a weighmaster at a point not equipped for marking freight cars, as provided in paragraph (d), ascertains the light weight of a car which is not marked in accordance with this rule, he shall attach to the car the prescribed "Light Weight Card" with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for remarking the car at first available station.

D. Do you favor the above recommendation?

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‡ and cubical capacity, except for flat and tank cars.

## MARKING OF FREIGHT-EQUIPMENT CARS.

Pages 804-805, Sheet M. C. B.—G.

To conform with the requirements of A. R. A. Car Service Rule 11, as amended November 20, 1912, the Committee on Revision of Standards and Recommended Practice recommends that the word "new" be stenciled on all new cars preceding the word "weight," and that Sheet M. C. B.—G be changed accordingly.

E. Do you favor the above recommendation?

## CAST-IRON WHEELS.

Pages 691-5, Sheets M. C. B.—N, O and P.

The Car Wheel Committee considered the question of establishing a maximum gross load for each design of car wheel. This had particular reference to failures of cast-iron wheels used on heavy tare weight, such as refrigerator cars, and recommends that the titles of the chilled cast-iron wheels shown on M. C. B. Sheets N, O and P be changed as follows:

Sheet N. Change to read:

M. C. B. Association Recommended Practice for 33-inch cast-iron wheels for cars of maximum gross weight, not to exceed 112,000 pounds.

Sheet O. Change to read:

M. C. B. Association Recommended Practice for 33-inch cast-iron wheels for cars of maximum gross weight, not to exceed 132,000 pounds.

Sheet P. Change to read:

M. C. B. Association Recommended Practice for 33-inch cast-iron wheels for cars of maximum gross weight, not to exceed 161,000 pounds.

F. Are you in favor of the adoption of the above recommendation?

## END FOR HOPPER-DOOR OPERATING SHAFT.

The Committee on Revision of Standards and Recommended Practice suggests the adoption of dimensions of end for hopper-

door operating shafts to permit the use of a standard wrench, and suggests as a Recommended Practice a 2-inch square end for that purpose.

G. Do you favor the above recommendation?

#### SIDE-BEARING SPACING.

The Committee on Revision of Standards and Recommended Practice calls attention to the difficulty experienced with cars with arch-bar trucks, or trucks with rigid side frames, and having side bearings located outside gauge of track, and suggests as a Recommended Practice that the maximum side-bearing spacing should not exceed the rail gauge, with a minimum of 44-inch centers, and a minimum clearance between side bearings of  $\frac{3}{16}$  inch.

H. Do you favor the above recommendation?

#### TEN-INCH CYLINDERS FOR FREIGHT CARS.

The Committee on Train Brake and Signal Equipment suggests as a Recommended Practice that all freight cars weighing between 37,000 pounds and 58,000 pounds be equipped with 10-inch brake cylinders.

I. Do you favor the above recommendation?

#### BRAKING POWER FOR FREIGHT CARS.

The Committee on Train Brake and Signal Equipment suggests as a Recommended Practice that the braking power for freight equipment should be 60 per cent of the light weight of the car, based on 50 pounds per square inch cylinder pressure.

J. Do you favor the above recommendation?

#### TRIPLE VALVES FOR FREIGHT CARS.

The Committee on Train Brake and Signal Equipment believes that the time is now opportune for adopting a triple valve for all

freight-car equipment. With this object in view it has corresponded with the air-brake companies to ascertain what triple they would recommend for this class of service, with the result that the K-1 for 8-inch and the K-2 for 10-inch equipments be recommended. The committee therefore suggests the adoption of the K-1 and K-2 triple valves as a Recommended Practice.

K. Do you favor the above recommendation?

#### SIZE OF BRAKE PIPE FOR PASSENGER CARS.

The Committee on Train Brake and Signal Equipment advises that, on account of the increased weight and length of passenger trains, the highest degree of perfection in the operation to obtain uniform application and to avoid the annoyance from sticking brakes in releasing is more necessary than ever before. The internal diameter of the brake pipe plays a very important part in the satisfactory operation of the brake, and after very careful consideration of the subject it would recommend for adoption as Recommended Practice that no pipe having an internal diameter less than that of 1-inch standard weight be used on passenger cars, and that for all new equipment 1¼-inch extra-heavy pipe be used.

L. Do you favor the above recommendation?

#### GALVANIZED BRAKE PIPE AND FITTINGS FOR REFRIGERATOR AND COAL CARS.

The action of acids and salt-water drippings from coal and refrigerator cars falling onto the brake pipe and fittings cause them to deteriorate very rapidly, and the amount of damage done is known to be very large. The cost of galvanizing does not add very materially to the cost, and therefore the Committee on Train Brake and Signal Equipment recommends that the galvanizing of all brake pipe and fittings be adopted as a Recommended Practice.

M. Do you favor the above recommendation?





## POSITION OF BOLTING LUGS OF HOSE CLAMPS.

Sheet M. C. B.—Q.

The Committee on Train Brake and Signal Equipment calls attention to the position of bolting lugs as shown on Sheet M. C. B.—Q, and advises that as there applied they interfere with the operator's hand where operating the angle cock, and at the coupling, and will interfere with the steam hose where cars are equipped with both the air and steam lines.

The Committee recommends that a specification providing for the proper application of the clamps to the hose be prepared and Sheet M. C. B.—Q be changed to conform thereto.

N. Do you favor the above recommendation?

## BRAKE BEAMS.

The Committee on Brake Shoe and Brake Beam Equipment recommends that Brake Beam No. 2, shown on Sheet M. C. B.—17-B herewith, be adopted as Recommended Practice.

O. Do you favor the above recommendation?

## SPECIFICATIONS GOVERNING DIMENSIONS AND TOLERANCES FOR SOLID WROUGHT-STEEL WHEELS FOR FREIGHT AND PASSENGER SERVICE.

Page 696.

The Committee on Car Wheels submits revised specifications on the above subject, having provided for the process of manufacturing and the chemical and physical properties of the materials. These specifications were thoroughly discussed at the convention and a recommendation prevailed that they be submitted to letter ballot for adoption as Recommended Practice, omitting the provision regarding the limits of segregation.

The specifications are as follows:

Specification for solid wrought carbon steel wheels for freight and passenger service.

#### I. MANUFACTURE.

1a. PROCESS.—The steel shall be made by the open-hearth process.

1b. DISCARD.—A sufficient discard shall be made from the top of each ingot from which the blanks are made, to insure freedom from injurious piping and undue segregation.

#### II. CHEMICAL PROPERTIES AND TESTS.

2a. CHEMICAL COMPOSITION.—The steel shall conform to the following requirements as to chemical composition.

	ACID.		BASIC.	
Carbon .....	0.60	—0.80	0.65	—0.85 per cent
Manganese .....	0.55	—0.80	0.55	—0.80 per cent
Silicon .....	0.15	—0.35	0.10	—0.30 per cent
Phosphorus .....	not over 0.05		not over 0.05 per cent	
Sulphur .....	not over 0.05		not over 0.05 per cent	

2b. LADLE ANALYSES.—To determine whether the material conforms to the requirements specified in Section II, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

2c. CHECK ANALYSES.—A check analysis may be made by the purchaser from any one or more wheels representing each melt and this analysis shall conform to the requirements specified in Section II. A sample may be taken from any one point in the plate; or two samples may be taken, in which case they shall be on radii at right angles to each other. Samples shall not be taken in such a way as to impair the usefulness of the wheel. Drillings for analysis shall be taken by boring entirely through the sample parallel to the axis of the wheel; they shall be clean from scale, oil, and other foreign substances. All drillings from any one wheel shall be thoroughly mixed together.

#### III. TOLERANCES.

3. Wheels should be furnished rough bored and with faced hubs and have a contour of tread and flange as rolled or machined according to recommended practice Sheet M. C. B. C. They should conform to dimensions specified within the following tolerances:

3a. HEIGHT OF FLANGE.—The height of flanges should not be more than  $\frac{1}{8}$  inch over and must not be under that specified or 1 inch.

3b. THICKNESS OF FLANGE.—Thickness of flange shall not vary more than  $\frac{1}{8}$  inch over or under that specified.

3c. THROAT RADIUS.—The radius of the throat shall not vary more than  $\frac{1}{8}$  inch over or under that specified.

3d. **THICKNESS OF RIM.**—The thickness of rim to be measured between the limit of wear groove and the top of the tread at the point where it joins the fillet at throat of flange. The average thickness of service metal of all wheels in any shipment must not be less than  $1\frac{3}{4}$  inches measured from the limit of wear groove to top tread. The thickness of rim should in no case be less than  $\frac{1}{8}$  inches under that specified.

3e. **WIDTH OF RIM.**—The width of rim shall not be more than  $\frac{1}{8}$  inch less nor more than  $\frac{1}{8}$  inch over that specified.

3f. **THICKNESS OF PLATE.**—The thickness of the plate of the wheel shall not be less than  $\frac{3}{4}$  inch at the point where the plate joins the fillet at the rim and not less than 1 inch at the point where the plate joins the fillet at the hub. Intermediate minimum thickness to be proportional.

3g. **LIMIT OF WEAR GROOVE.**—The limit of wear groove to be located as shown in Sheet M. C. B. C. recommended practice.

3h. **DIAMETER OF BORE.**—The diameter of rough bore shall not vary more than  $\frac{1}{8}$  inch above or below that specified. When not specified the rough bore shall be  $\frac{1}{4}$  inch less in diameter than the finished bore subject to the above limitations.

3i. **HUB DIAMETER.**—The hub diameter may be either 10 inches or 11 inches in diameter as specified with a maximum variation of  $\frac{1}{8}$  inch below. The thickness of the wall of the finished bored hub shall not vary more than  $\frac{3}{8}$  inch at any two points on the same wheel.

3j. **HUB LENGTH.**—The length of hub shall not vary more than  $\frac{1}{8}$  inch over or under that specified.

3k. **DEPRESSION OF HUB.**—The depression of the hub must be made so that the distance from the outside face of the hub to the line "AB" shall not exceed  $1\frac{1}{4}$  inches for wheels used on  $5\frac{1}{2}$ -inch axles and under and  $1\frac{1}{8}$  inches for wheels used on 6 by 11 inch axles.

3l. **BLACK SPOTS IN HUB.**—Black spots will be allowed within two inches of the face of the hub, but must not be of such depth that they will not bore out and give clear metal at finished size of bore.

3m. **ECCENTRICITY OF BORE.**—The eccentricity between the tread at its center line and the rough bore shall not exceed  $\frac{3}{64}$  inch.

3n. **BLOCK MARKS ON TREAD.**—The maximum height of block marks must not be greater than  $\frac{1}{64}$  inch.

3o. **ROTUNDITY.**—All wheels shall be gaged with a ring gage and the opening between the gage and tread at any one point shall not exceed  $\frac{1}{8}$  inch.

3p. **PLANE.**—Wheel shall be gaged with a ring gage placed concentric and perpendicular to the axis of the wheel. All points on the back of the rim equidistant from the center shall be within a variation of  $\frac{1}{8}$  inch from the plane, of the same gage when so placed.

3q. **TAPE SIZES.**—Wheels shall not vary more than five tapes under nor nine tapes over the size called for.

3r. **MATING.**—The tape sizes shall be marked in plain figures on each wheel. Wheels must be mated to tape sizes and shipped in pairs.

3s. **GAGE.**—Gages and tape used shall be M. C. B. Standard or Recommended Practice as follows:

Wheel circumference measure, M. C. B. Standard, Sheet 16-A.

Maximum flange thickness gage, M. C. B. Standard, Sheet 16.

Minimum flange thickness gage, M. C. B. Standard, Sheet 16.

Rotundity gage, M. C. B. Recommended Practice, Sheet C.

Plane Gage, M. C. B. Recommended Practice, Sheet C.

Gage for measuring service metal, M. C. B. Recommended Practice, Sheet C-1.

#### IV. BRANDING.

The name or brand of the manufacturer, date, and serial number shall be legibly stamped on each wheel in such a way that the wheel may be readily identified. The tape size shall be legibly marked on each wheel. Sheet M. C. B. C-2.

#### V. FINISH.

5. The wheel shall be free from injurious defects, and shall have a workmanlike finish.

5a. Wheels shall not be offered for inspection if covered with paint, rust, or any other substance to such an extent as to hide defects.

#### VI. INSPECTION.

6. Inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturers' work which concern the manufacturer of the material ordered.

6a. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary gages to satisfy him that the wheels are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment, and free of cost to the purchaser.

6b. The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere as may be decided by the purchaser. Such tests, however, shall be made at the expense of the purchaser.

6c. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

6d. Wheels show injurious defects while being finished by the purchaser shall be rejected, and manufacturer properly notified.

6e. Samples of rejected material must be preserved at the laboratory of the purchaser for one month from date of test report. In case of dis-

satisfaction with the results of the test, manufacturer may make claim for a re-hearing in that time.

P. Are you in favor of the adoption of this recommendation?

On account of dimensions of plates being added to the designs of steel wheels shown in the 1912 report, the Committee on Car Wheels recommends that new cuts be made to show the following wheels :

33-inch solid steel wheels for  $5\frac{1}{2}$  by 10 inch axles and under. See Exhibit A-1 herewith.

36-inch solid steel wheels for  $5\frac{1}{2}$  by 10 inch axles and under. See Exhibit A-2 herewith.

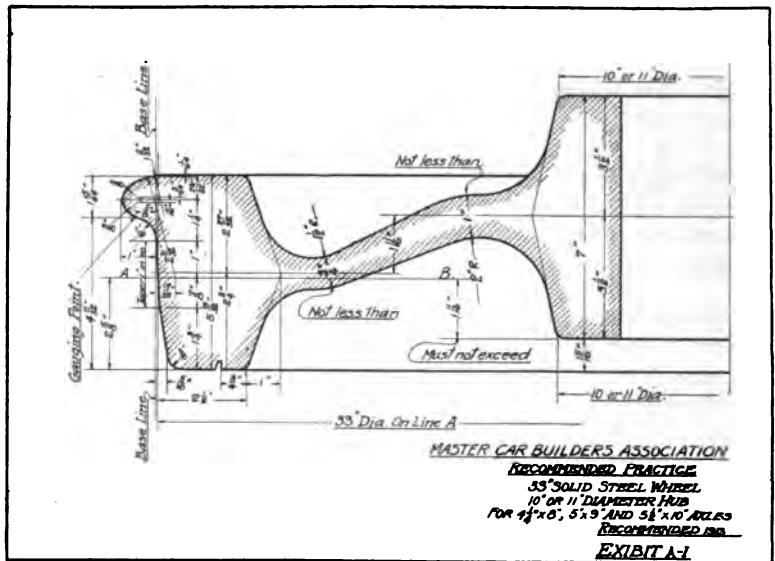
38-inch solid steel wheels for  $5\frac{1}{2}$  by 10 inch axles and under. See Exhibit A-3 herewith.

33-inch solid steel wheels for 6 by 11 inch axles. See Exhibit B-1 herewith.

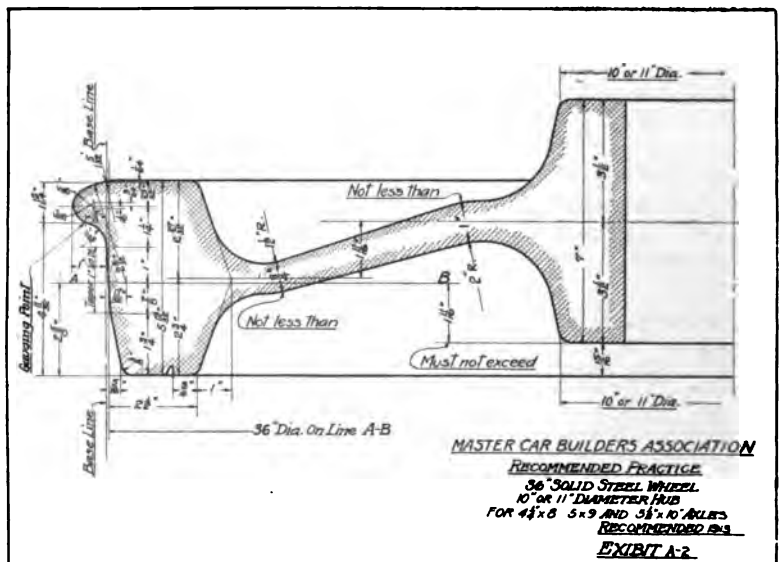
36-inch solid steel wheels for 6 by 11 inch axles. See Exhibit B-2 herewith.

38-inch solid steel wheels for 6 by 11 inch axles. See Exhibit B-3 herewith.

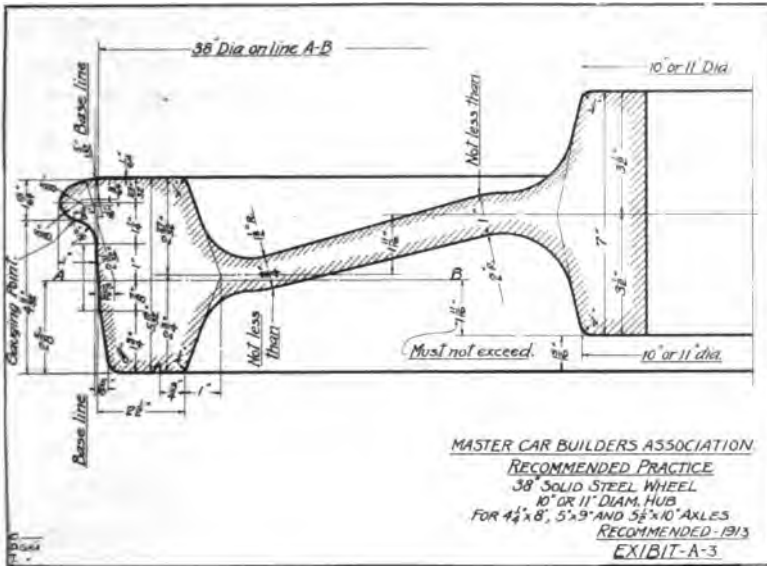
Q. Are you in favor of this recommendation?



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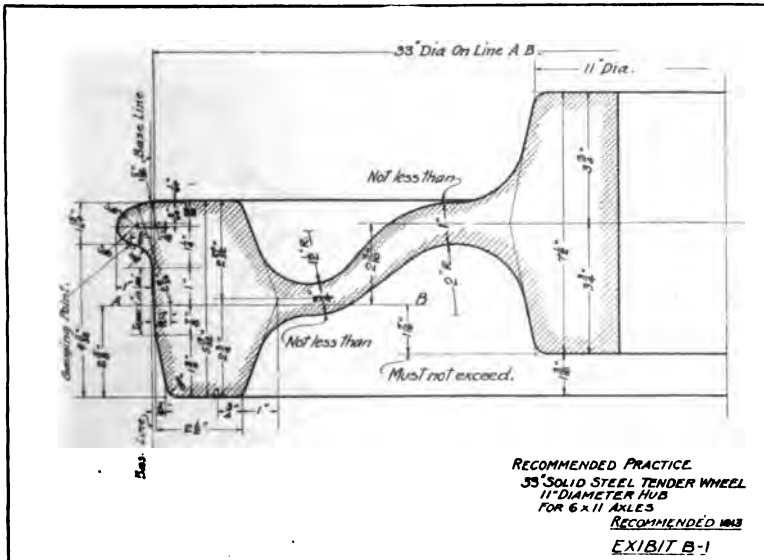


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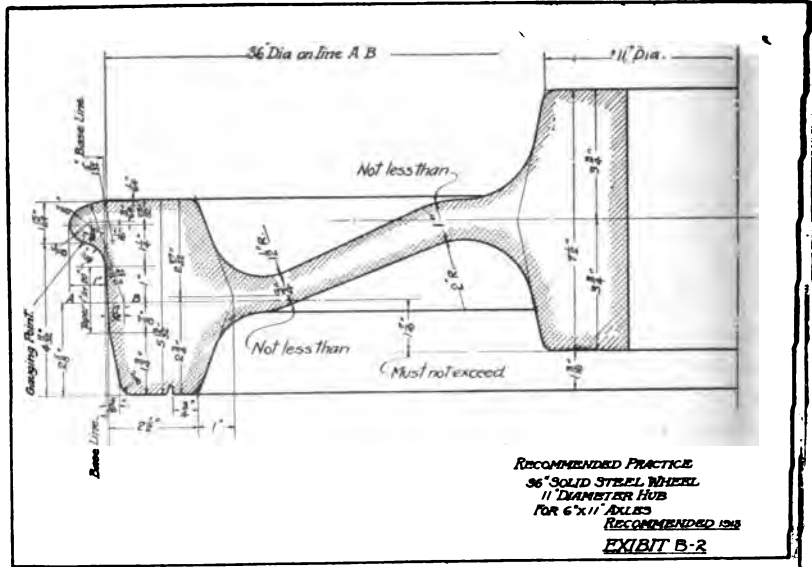


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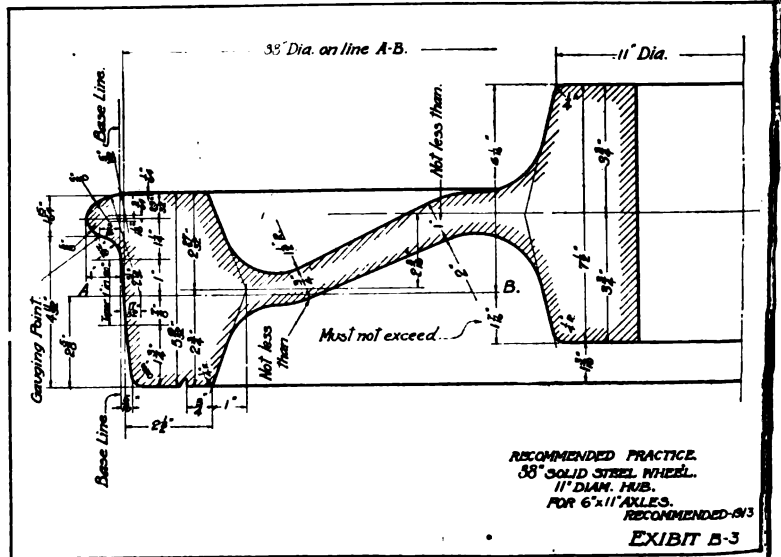
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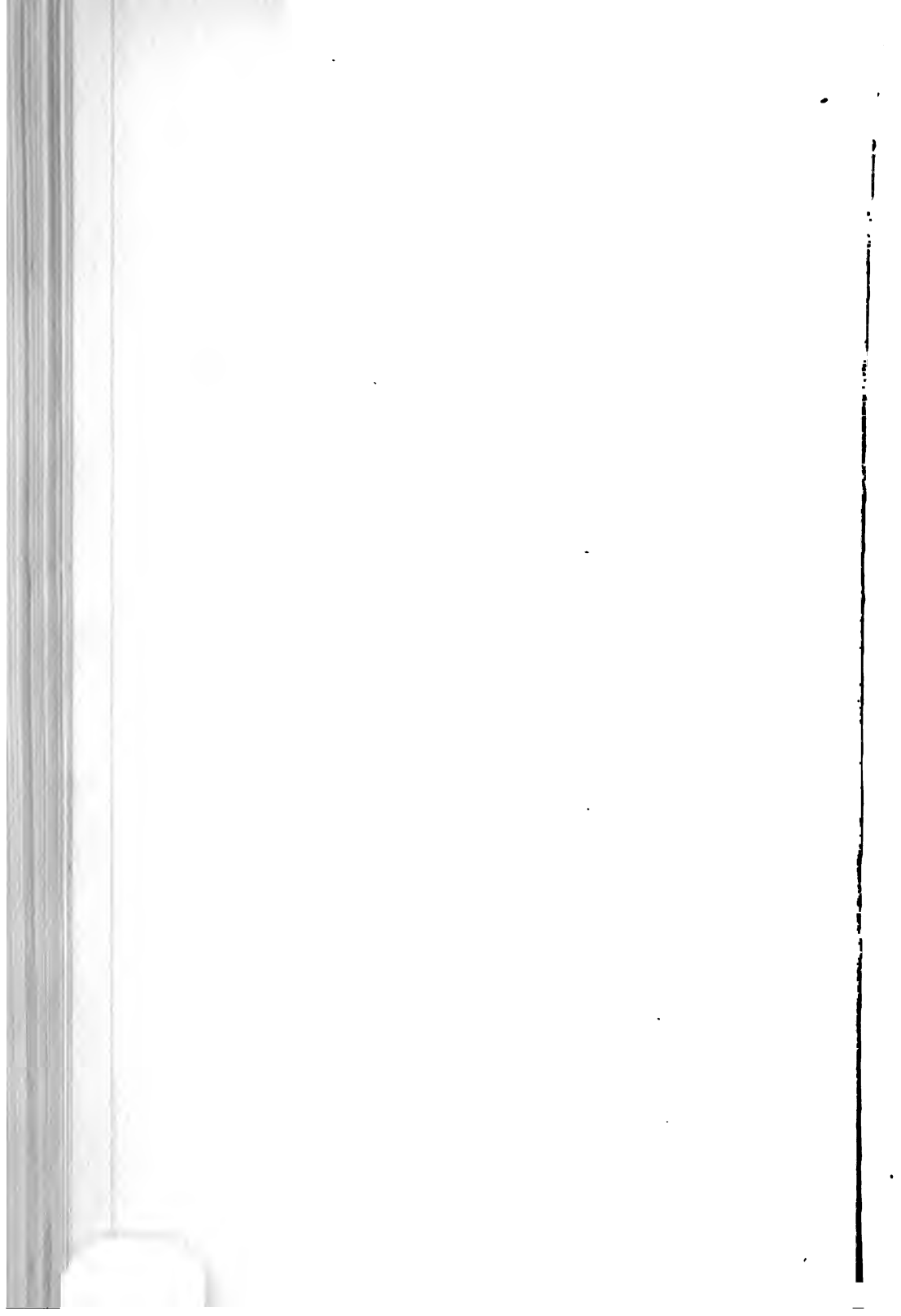
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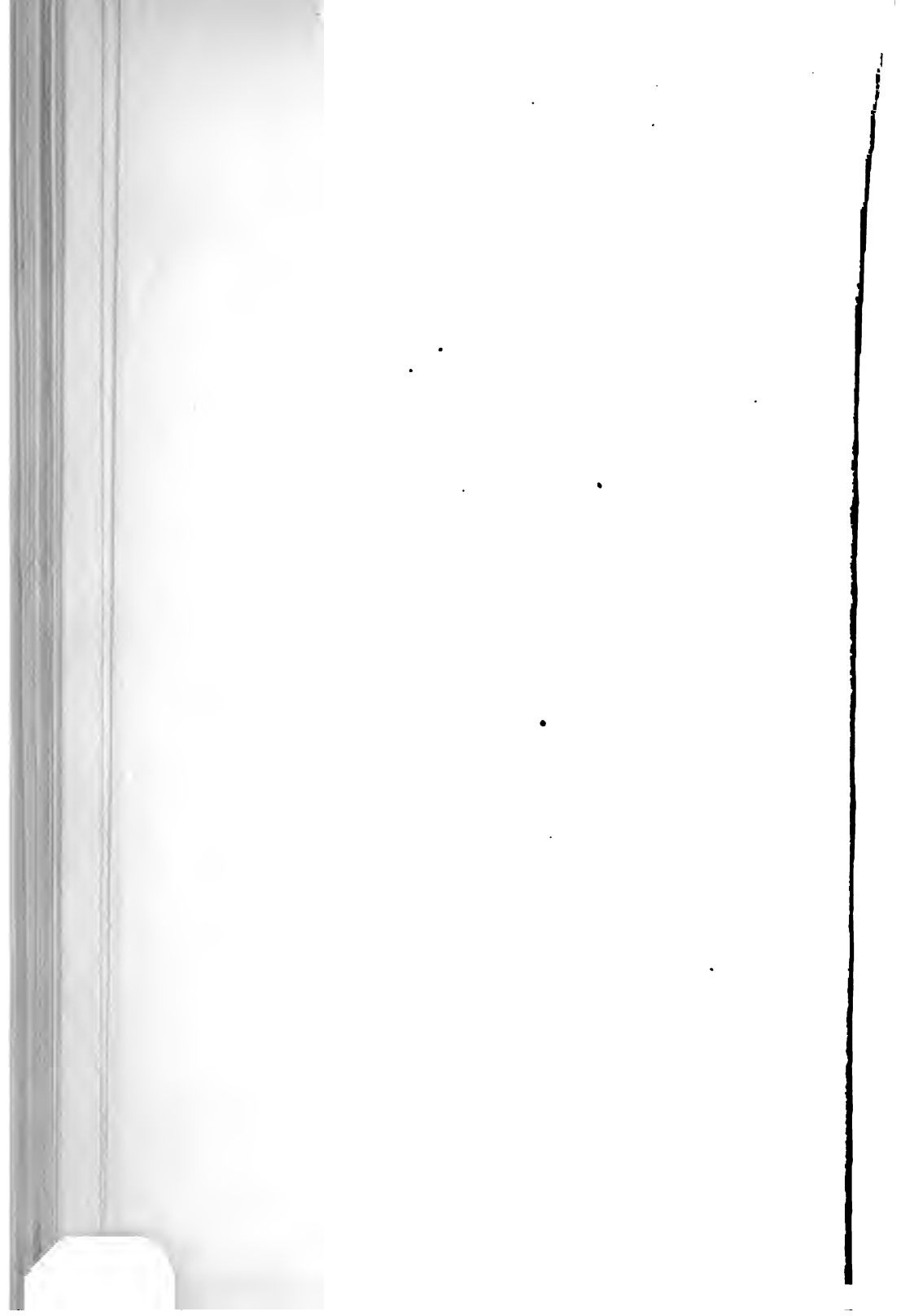
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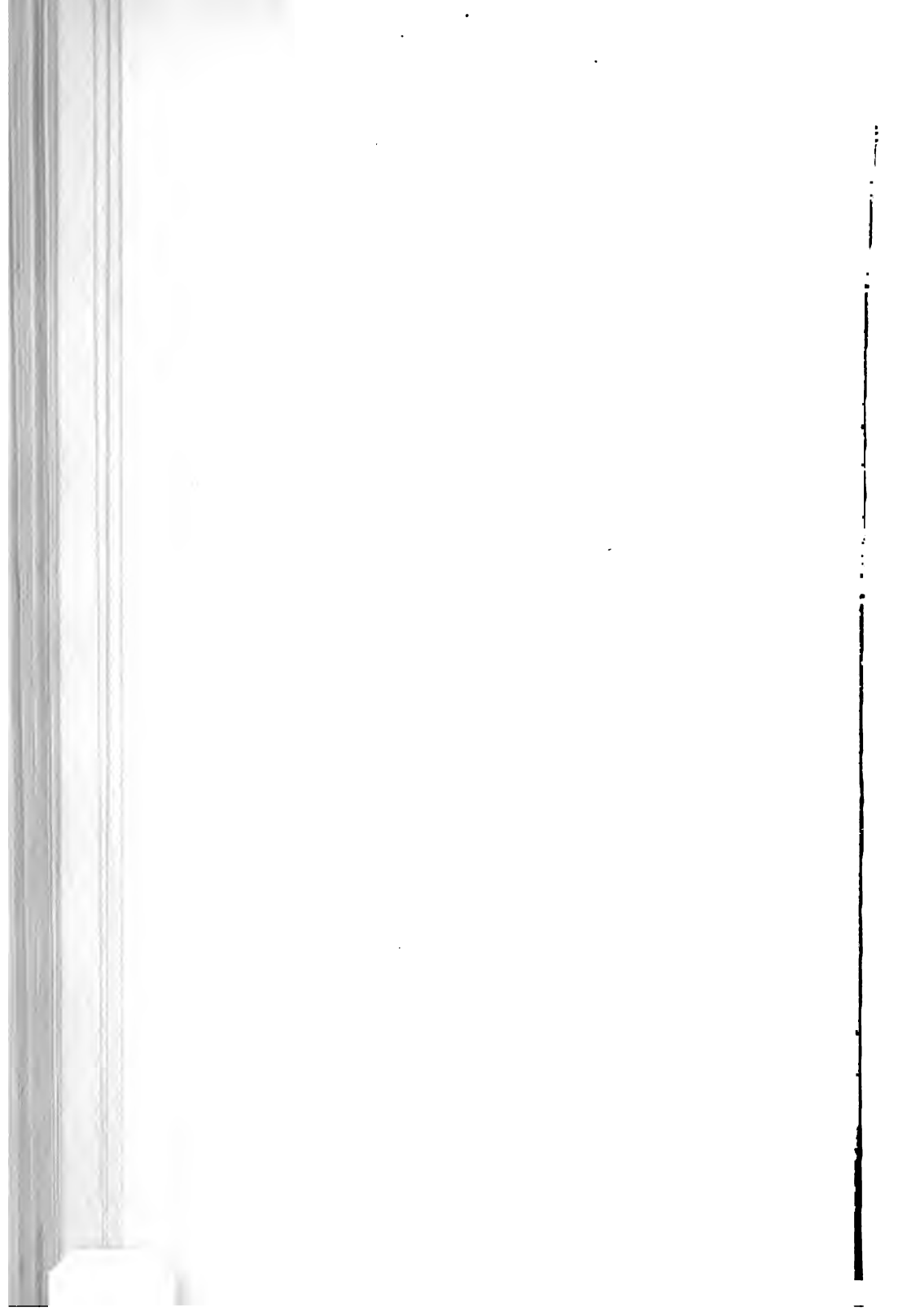










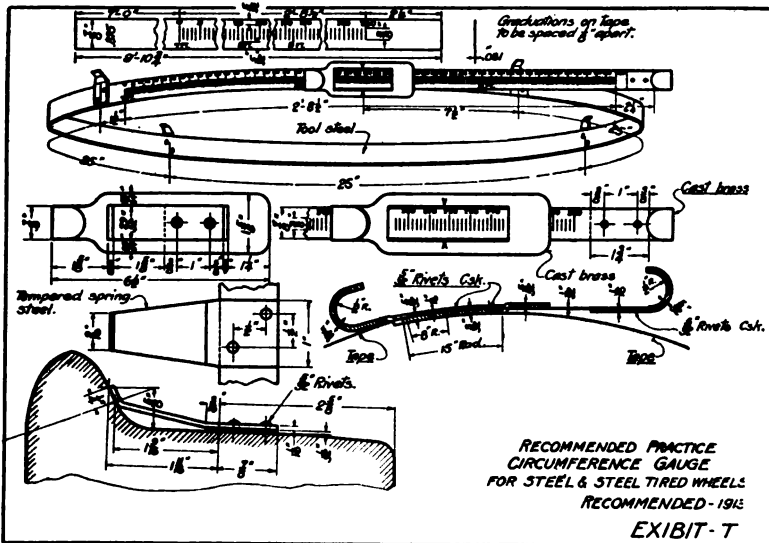






## WHEEL-CIRCUMFERENCE MEASURE FOR STEEL OR STEEL-TIRED WHEELS.

The present standard circumference measure for cast-iron wheels has been found unsatisfactory for using with steel or steel-tired wheels. The Committee on Car Wheels therefore proposes as a Recommended Practice a new circumference measure for taping steel wheels. It is shown on Exhibit T, herewith.



THIS DRAWING FORMS PART OF REPORT OF THE FISH H.C.S. COMMITTEE ON CAR WHEELS  
AND OF THE FISH MASTER MECHANICS COMMITTEE ON ENGINE AND TENDER WHEELS

DWG. S-76172  
REVISED, 1914

R. Are you in favor of the adoption of this recommendation?

## JOURNAL BOX, BEARING, WEDGE AND LID FOR STANDARD AXLE WITH 6 BY 11 INCH JOURNALS.

The Committee on Car Trucks submits for adoption as Recommended Practice the following items:

Journal box. See Exhibit B.

S. Are you in favor of the recommendation?

Journal bearing. See Exhibit C.

T. Are you in favor of the recommendation?

Journal wedge. See Exhibit C.

U. Are you in favor of the recommendation?

Journal box lid. See Exhibit C.

V. Are you in favor of the recommendation?

Journal bearing and wedge gauges. See Exhibit D.

W. Are you in favor of the recommendation?

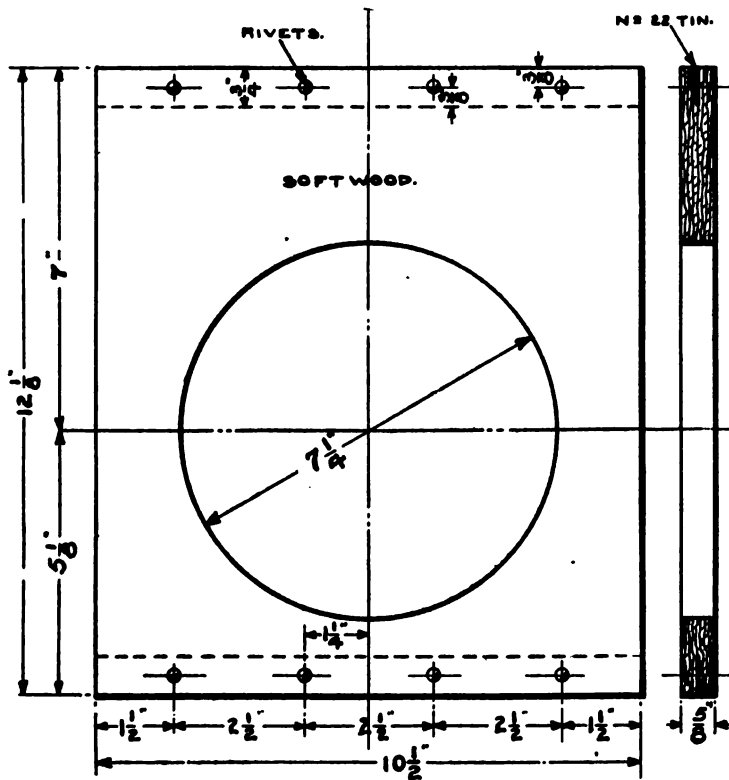
Journal-box dust guard. See Exhibit E.

X. Are you in favor of the recommendation?

Journal-box gauges.

Y. Are you in favor of the recommendation?

**DUST GUARD FOR  
JOURNAL BOX 6" X 11".  
EXHIBIT "E."**



## TRAIN LIGHTING.

Page 962, Sheets M. C. B.— U to U-9.

The Committee on Train Lighting submits the following suggestions for adoption as Recommended Practice:

## AXLES FOR AXLE DYNAMOS.

1. Axles for application of axle pulleys should be in accordance with dimensions shown on Exhibit "A" herewith. Three designs are shown: First, axle in accordance with M. C. B. Standard, rough-turned; second, axle straight between the wheel-fit collars, rough-turned, and third, axle with straight pulley fit.

Z. Do you favor the adoption of the three designs of axles?

## DESIGN OF AXLE-DYNAMO SUSPENSION.

2. Axle-dynamo suspensions must be designed so that with full diameter wheels and truck on straight, level track, any part of the dynamo or suspension must have a clearance not less than 6 inches above top of rail, and a clearance of at least  $3\frac{1}{2}$  inches between any part of the mechanism attached to the car body.

AA. Do you favor the above recommendation?

3. In axle-dynamo suspension the metal carrying the weight of the dynamo must not be subjected to wear.

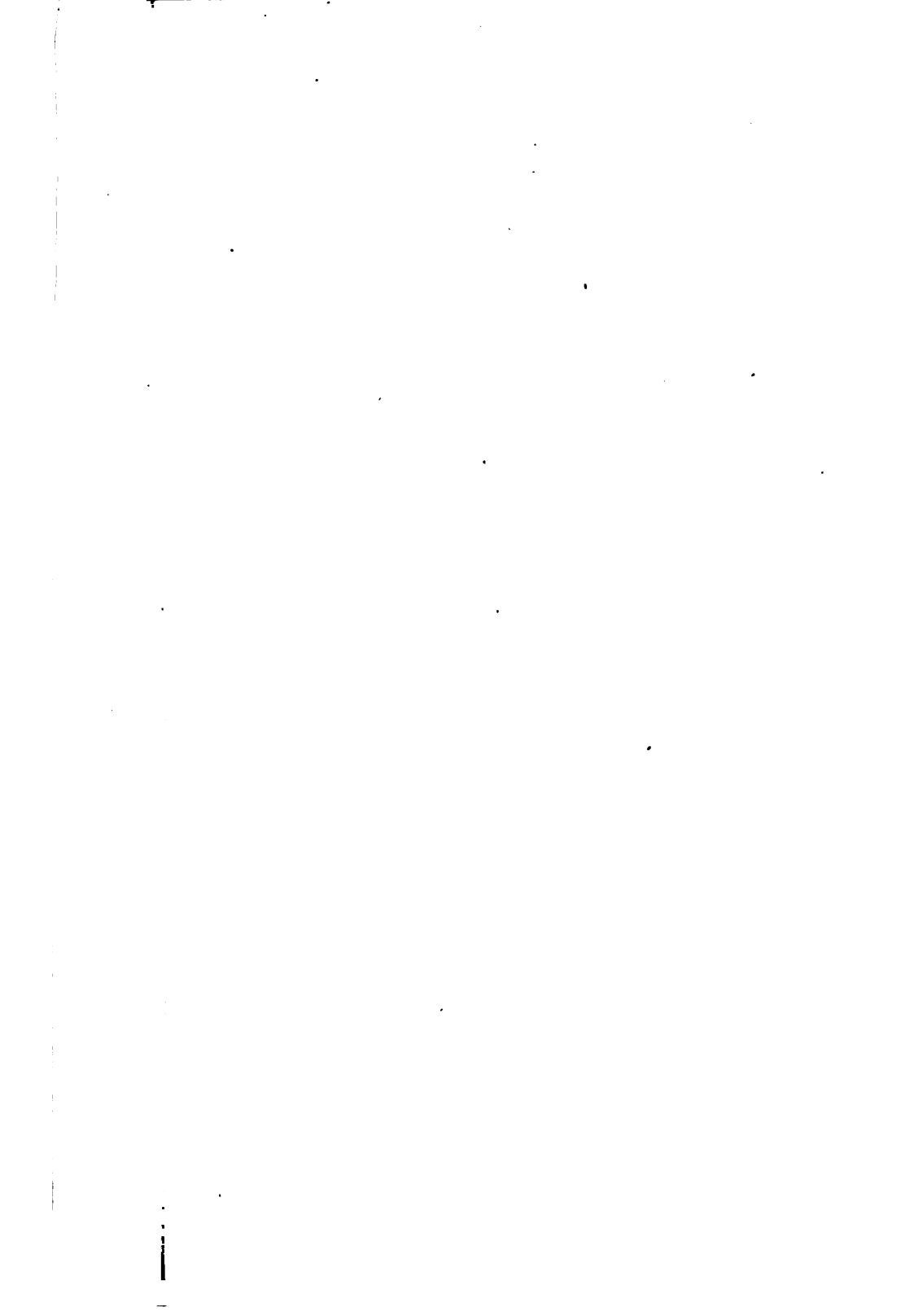
BB. Do you favor the above recommendation?

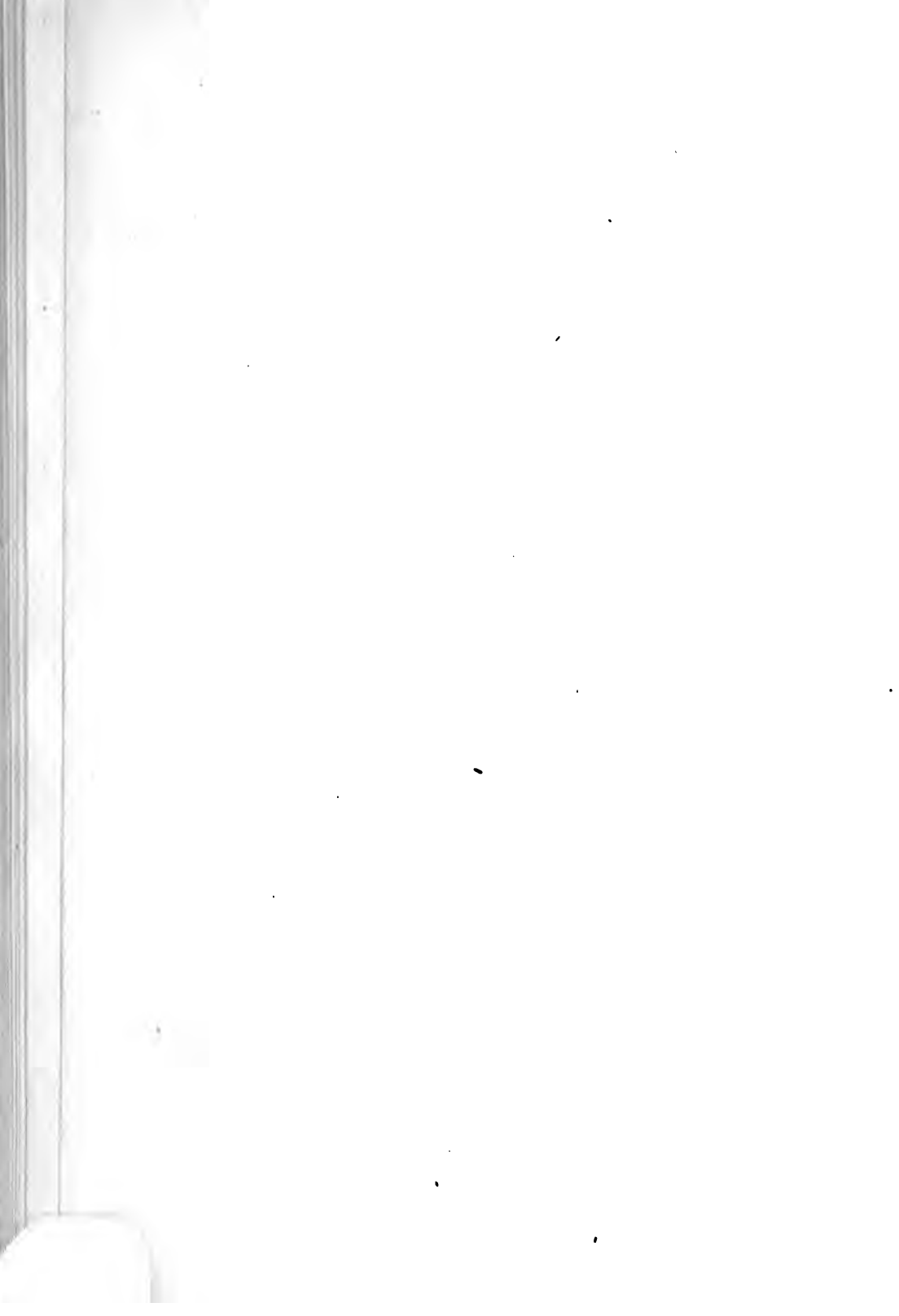
4. In axle-dynamo suspensions, if side arms are used, the end to be secured to the truck frame must extend under the transom and be bolted to the side frame near the transom, and if carried through or over end sill, must be held securely to end sill by a hooked bolt not less than  $\frac{3}{4}$  inch in diameter.

CC. Do you favor the above recommendation?

5. When possible, the belt should go over the end sill and under the brake beam, with belt clearances of at least an inch.

DD. Do you favor the above recommendation?





6. A typical design covering the general requirements in the above recommendations is shown on Exhibit B herewith, and is recommended where applicable.

EE. Do you favor the above recommendation?

#### DESIGN OF BATTERY BOX.

7. The inside clear dimensions of battery boxes should be as follows: Depth, front to back, 2 feet 4 inches; height in clear, not less than  $21\frac{1}{2}$  inches; length of compartment for two standard double-compartment tanks, or equivalent,  $22\frac{5}{8}$  inches.

Length of compartment for four standard double-compartment tanks, or equivalent, 3 feet  $9\frac{1}{4}$  inches.

FF. Do you favor the above recommendations?

8. Battery boxes with two compartments each  $22\frac{5}{8}$  inches long, or with one compartment 3 feet  $9\frac{1}{4}$  inches, must be designed to safely carry a battery weight of 1,600 pounds. Battery boxes with four compartments each  $22\frac{5}{8}$  inches long, or two compartments each 3 feet  $9\frac{1}{4}$  inches long, must be designed to carry a battery weight of 3,200 pounds.

GG. Do you favor the above recommendation?

9. In all battery-box designs two angle irons or straps shall extend longitudinally under the battery box in such a location that in case of a defective battery box floor the battery trays will be supported by the said angle irons or straps. The angle iron or straps shall be supported to the car body independent of the battery box proper and shall be of sufficient strength in all parts to safely support the battery in accordance with the weight shown in the preceding paragraph, and the additional weight of the battery box proper, and the angle iron or straps and the supports for same, shall be so installed that they can be readily inspected for corrosion.

HH. Do you favor the above recommendation?

Under the caption of "Axle Dynamo," page 966, the following should be added to paragraph 18:

Diameter of axle pulleys should preferably be 17 inches or 21 inches; the diameter of generator pulley should preferably be 8 inches or 11 inches.

II. Do you favor the above recommendation?

Following paragraph 19, under the head of "Axle Dynamo," should be added the following:

The electric connector between the dynamo leads and permanent wiring on the car should be made with non-reversing self-locking receptacle and plug.

JJ. Do you favor the above recommendation?

## STEAM AND AIR CONNECTIONS FOR PASSENGER CARS.

Page 898, Sheet M. C. B.—Q.

The Committee on Train Pipe and Connections for Steam Heat submits specifications for steam-heat hose for passenger cars, also specifications for steam-hose couplings, both of which were referred to letter ballot for adoption as Recommended Practice, as follows:

### SPECIFICATIONS FOR STEAM-HEAT HOSE FOR PASSENGER EQUIPMENT CARS.

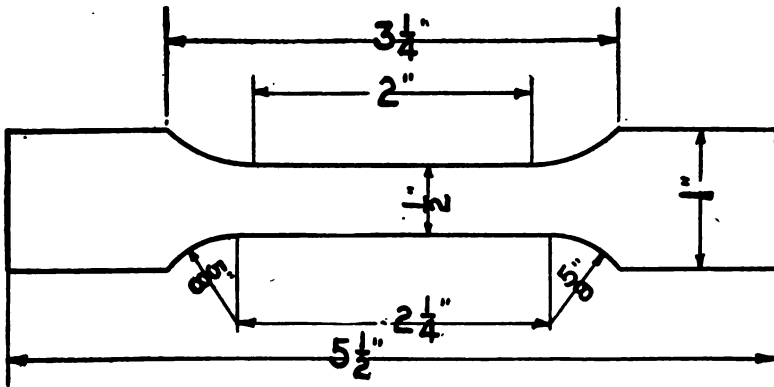
#### 1 — MANUFACTURE.

Steam-heat hose must be composed of a tube of rubber, wrapped with five-ply cotton fabric and the whole covered with rubber.

#### 2 — PHYSICAL PROPERTIES AND TESTS.

The railway company's inspector will select for test one piece at random from each lot of 201 pieces. When this hose is received at the test laboratory, a section  $2\frac{1}{2}$  inches long will be cut from one end in order to determine the friction, tensile strength and elongation. The remaining portion will then be subjected to steam heat in the digester. After this section has been heated another section  $2\frac{1}{2}$  inches long will be cut from it and used to ascertain the friction, tensile strength and elongation, in order to show the change in these characteristics due to the action of heat.

**FRICTION TEST BEFORE STEAMING.**—A section 1 inch long will be cut from the hose and supported in such a manner that it will turn freely on its axis. A twenty-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.



## TENSILE SPECIMEN.

FIG. 1.

**TENSILE TEST BEFORE STEAMING.**—A strip cut from the tube with a die or other suitable means to the dimensions shown in Fig. 1 will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 600 pounds per square inch and the elongation of the 2-inch section at the time of fracture must not be less than 6 inches.

**FRICTION TEST AFTER STEAMING.**—A section 1 inch long will be supported in such a manner that it will turn freely on its axis. A fifteen-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.

**TENSILE TEST AFTER STEAMING.**—A strip cut from the tube with a die or other suitable means to the dimensions shown in Fig. 1 will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 450 pounds per square inch, and the elongation of the 2-inch section at the time of fracture must not be more than 8 inches or less than 4 inches.

## 3 — SIZE AND DIMENSIONS.

	Maximum, Inches.	Minimum, Inches.
Length .....	24 $\frac{1}{4}$	23 $\frac{3}{4}$
Inner diameter .....	....	....
Outer diameter .....	....	....
Thickness of tube.....	....	$\frac{3}{8}$
Thickness of cover.....	....	$\frac{1}{8}$

## 4 — WORKMANSHIP.

**TUBE.**— The tube should be composed of at least two calenders of rubber. It must be free from holes, bits of wood, bark, sand and other foreign matter, and from other imperfections. It must be so firmly joined to the fabric that it can not be pulled off without tearing it.

**FABRIC.**— The fabric must be of duck, with the warp containing not less than 27 strands, 3 threads per strand, and the filler 18 strands and 4 threads per strand. It must be frictioned on both sides and have, in addition, a distinct layer of rubber on one side, readily visible between the plys when the finished hose is cut open.

**COVER.**— The material of the cover should be a rubber compound which has good weather-resisting qualities, as firmly attached to the fabric as is the tube, and to be equally free from defects. The end of the hose should be cut off true to length, but shall not be capped.

## 5 — MARKING.

**SERIAL NUMBER.**— Each lot of 200 hose or less must bear the manufacturer's serial number, beginning with one on the first of each year and continuing consecutively until the end of the year. Serial numbers of hose which are rejected must not be used again. With each lot of 200 hose or less, one extra piece of hose must be furnished free of cost.

**LABEL.**— Each piece of hose must have securely vulcanized to it a label of white or red rubber, as shown herewith.

<b>A.B.C. ROAD</b>		<b>11 — 6</b>	
<b>NAME OF MANUFACTURER</b>	<b>COPYRIGHTED</b>	<b>SERIAL NUMBER</b>	

## 6 — INSPECTION.

**REJECTION.**— If the sample fails to pass the above tests, the lot represented by it will be rejected, and the same serial number must not be applied to any other steam hose during the same calendar year.

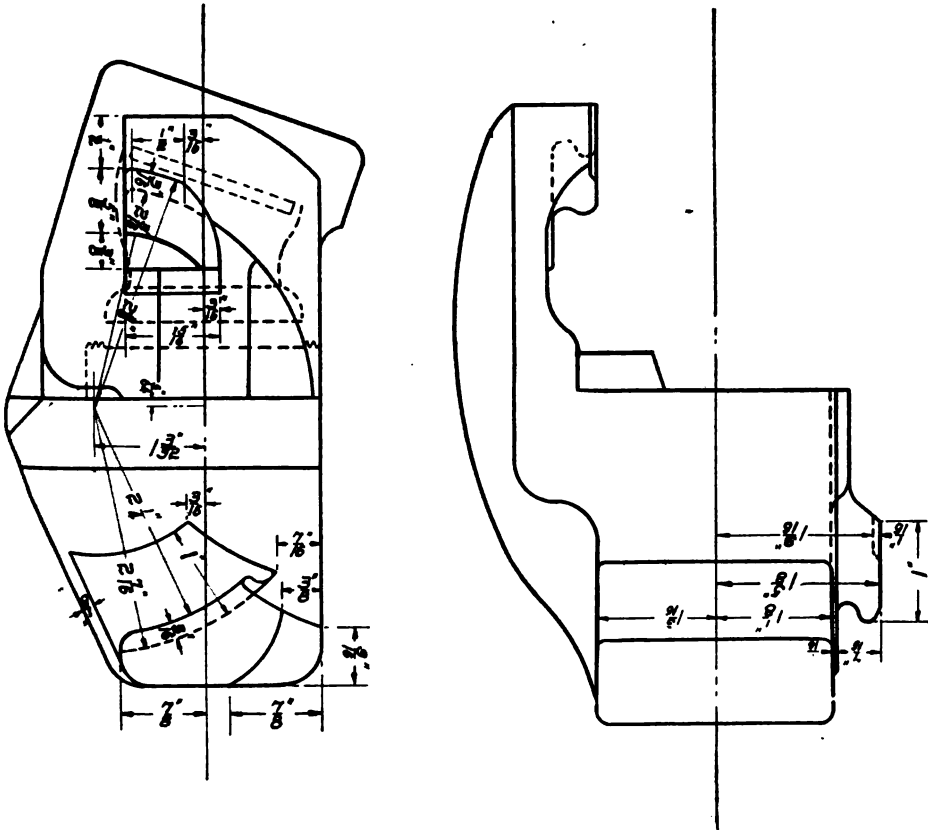
**INSPECTION.**— If the sample passes all the tests, all pieces represented by it will be accepted if free from injurious mechanical defects.

**Rejected hose will be returned at the expense of the manufacturer.**

**KK. Are you in favor of the recommendation?**

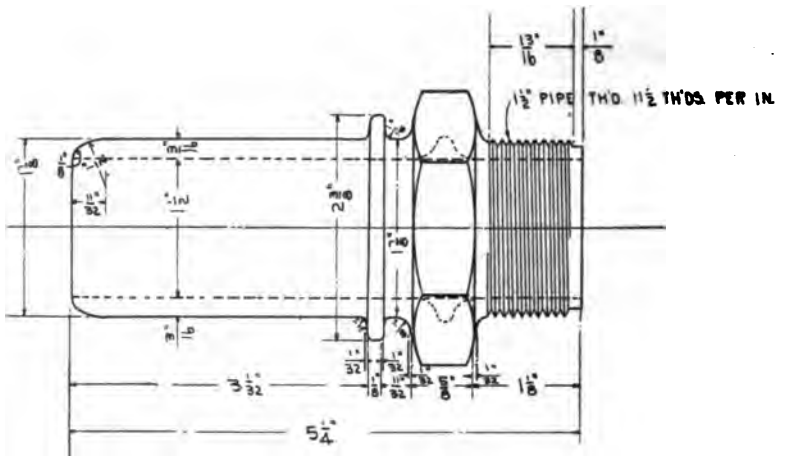
## STEAM-HOSE COUPLINGS.

1. Coupling contour to be such that coupling will interchange with the coupler as shown on Fig. 3.
2. Coupler must have a locking attachment which will securely lock the two couplers together without depending on the hose in any way.



**FIG. 3.**

3. The angle of the nipple to a line perpendicular to the coupling face of the coupling should not be less than 20 degrees.



**FIG. 4.**

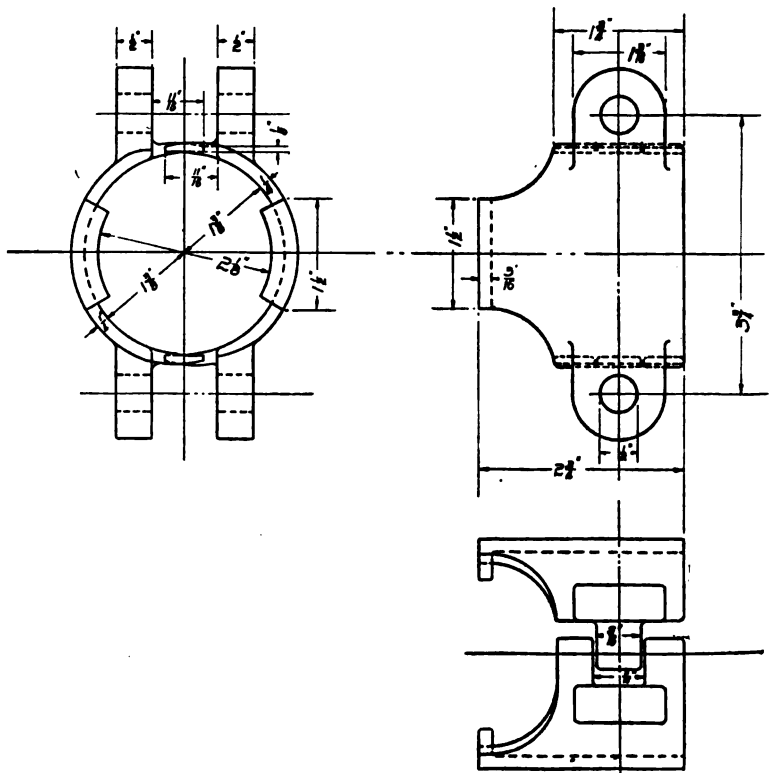


FIG. 5.

4. The coupler should be of the two-piece type, having the nipple separate and screwed into the coupler head with 1½-inch pipe thread. The nipple shall be of the type having a shoulder to engage clamp-nipple shown on Fig. 4.

5. The clamp shall be of the two-piece type, as shown on Fig. 5.

6. The minimum diameter of hole through gasket to be 1⅞ inches.

7. Gasket shall be flat face, securely held in place in coupler head, but so designed that they can be removed and replaced without removing hose or coupler head from car.

LL. Are you in favor of the recommendation?

## SPECIFICATIONS FOR TANK CARS.

Page 883.

The Committee on Tank Cars advises that nothing has transpired during the past year to call for any radical change in the tank-car specifications. The changes recommended below are principally with the view of removing ambiguities. They are as follows:

### SPECIFICATIONS FOR TANK CARS.

Definitions (Page 1).

Insert word "inflammable" before word "products" in third paragraph. Add sentence "This class may also include cars for the transportation of noninflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 25 pounds per square inch." So that paragraph will read:

*Ordinary Tank Car.* One used for the transportation of inflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 10 pounds per square inch. This class may also include cars for the transportation of noninflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 25 pounds per square inch.

General Requirements (Page 1).

Add new paragraph (b), as follows:

(b) Designs for "Special" tank cars must be submitted to the Master Car Builders' Association for approval.

Change present paragraph (B) to (c), and add proviso, so that paragraph will read:

(c) Tanks which bear evidence of damage by fire must be withdrawn from transportation service.

Provided, that where the damage to the tank is local only, or confined to a section which can be replaced, the railroad and the car owner may,

after a joint inspection, agree that all damaged material shall be replaced and the tank made absolutely safe for transportation service; but, before being returned to service, the tank and fittings must be again submitted to the prescribed hydraulic test, and properly stenciled.

Paragraph 5 — Test (Page 2).

Add to first paragraph "with the exception that where from the nature of the product carried, deterioration is to be expected in a shorter time, this period shall be reduced to five years. For the present, products requiring this five-year period should include chemicals such as acids, ammonia liquors, and such other products as may be hereafter specified."

Change third paragraph to read "The tank car owner shall be responsible for the proper carrying out of all tests and inspections." Paragraph 5 will then read:

5. *Test.*—Tanks must be carefully inspected and tested with cold water pressure at least once in ten years; with the exception that where tanks are used for carrying corrosive products, deterioration is to be expected in a shorter time, and the test period shall be reduced to five years. Products requiring this five-year period should include chemicals such as acids, ammonia liquors, and such other products as may be hereafter specified.

Second paragraph same as at present.

The tank car owner shall be responsible for the proper carrying out of all tests and inspections.

Paragraph 6 — Safety Valves (Page 2).

Change 1914 to 1915, in first line; add "not more than" before "10 pounds" in third line; change "and" to "or" between "1" and "2" in fifth line; so that paragraph will read:

6. *Safety Valves.*—By January 1, 1915, all tanks carrying products that give off volatile inflammable vapors at or below a temperature of 80° F., and having a vapor pressure of not more than 10 pounds per square inch at a temperature of 100° F., shall be equipped with 5-inch safety valves of approved design (Figs. 1 or 2), and these valves shall be set to open at a pressure of 12 pounds per square inch.

Paragraph 7 — Test of Safety Valves — (Page 5).

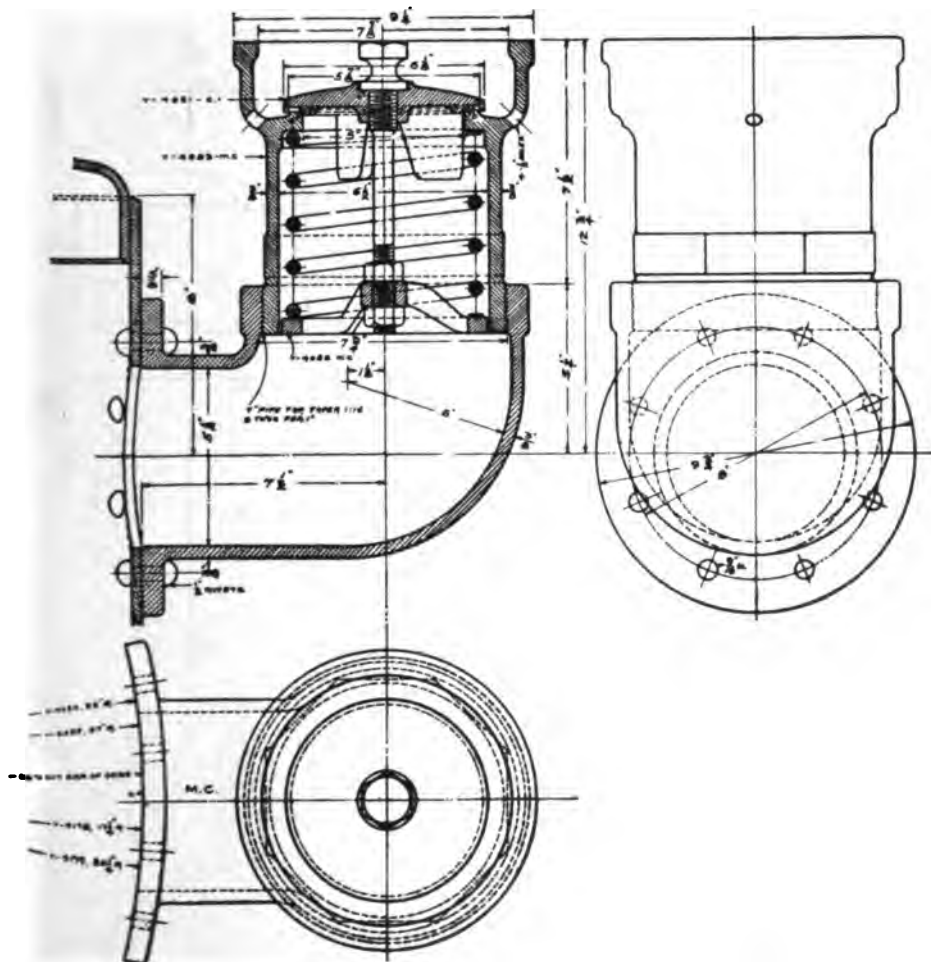
Change 1914 to 1915, in second line, so that paragraph will read:

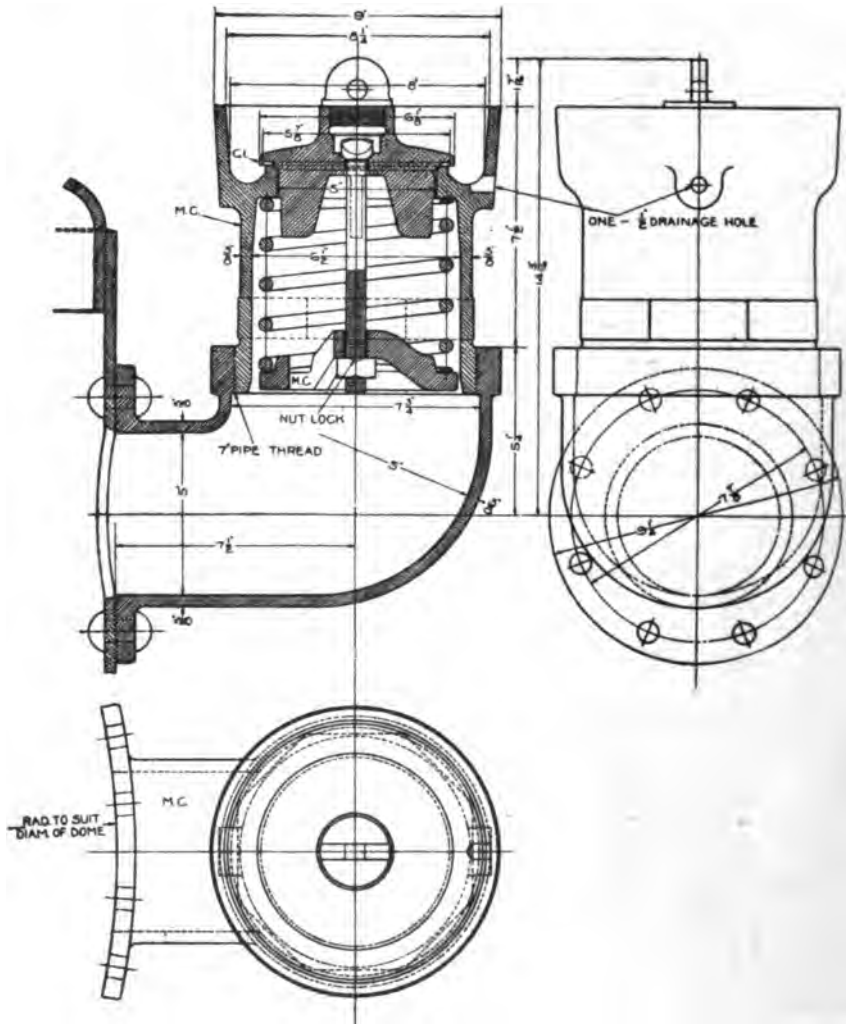
7. *Test of Safety Valves.*—All safety valves must be tested and adjusted, if necessary, by January 1, 1915, and at intervals of not over two years thereafter, and the date of the last test and pressure at which valve is set shall be plainly stenciled on the body of the valve, as follows:

Paragraph 8 — Five-inch Safety Vents with Lead Disks (Page 5).

Change "10" to "25" in third line, and "25" to "30" in sixth line, so that paragraph will read:

8. *Five-inch Safety Vents with Lead Disks.*—Tank cars carrying





**FIG. 2.— Alternative 5-inch Safety Valve.**



volatile noninflammable products whose vapor pressure at a temperature of 100° F. does not exceed 25 pounds per square inch, may be provided with vents depending on frangible lead disks for safety, which vents shall be of approved design, as shown by Fig. 3, the disks to be of a thickness that shall insure rupture at a pressure not higher than 30 pounds per square inch.

Paragraph 9—Two-inch Vent Hole or Small Valve—(Page 5).

Change "20" in third line of second paragraph to "30," so that paragraph will read:

If, for any reason, splashing of the liquid or contamination by moisture is to be avoided, a 2-inch vent with frangible lead disk of a thickness which will insure rupture at a pressure not higher than 30 pounds, should be in place of the 2-inch open vent (Fig. 4).

Paragraph 10—Center Sills—(Page 5).

Change "cross-sectioned" to "cross-sectional" in second line; add "or equivalent" after "Fig. 5" in third line, so that paragraph will read:

10. *Center Sills.*—The center-sill construction of the underframe between bolsters must have an effective cross-sectional area of at least 10 square inches, distributed as shown in Fig. 5, or equivalent.

Paragraph 14—Tank Valve Extension Clearance—(Page 7).

Change "2½ inches" to "6 inches" in fourth line, so that paragraph will read:

14. *Tank Valve Extension Clearance.*—Steel underframe tank in which the tank is secured from end shifting by means of head blocks must have a longitudinal clearance for tank valve extension of not less than 6 inches on each side of valve.

Paragraph 15—Discharge Valve—(Page 7).

Add new paragraph "If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve. Change present paragraph by substituting "leaking must be prevented by packing and cap nut" for "precaution must be taken by packing and cap nut against leakage."

Paragraph would then read:

15. *Discharge Valve.*—If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve.

Preferably the top of the discharge valve handle should be within the tank, but in the event that it is carried through the dome, leaking must be prevented by packing and cap nut.

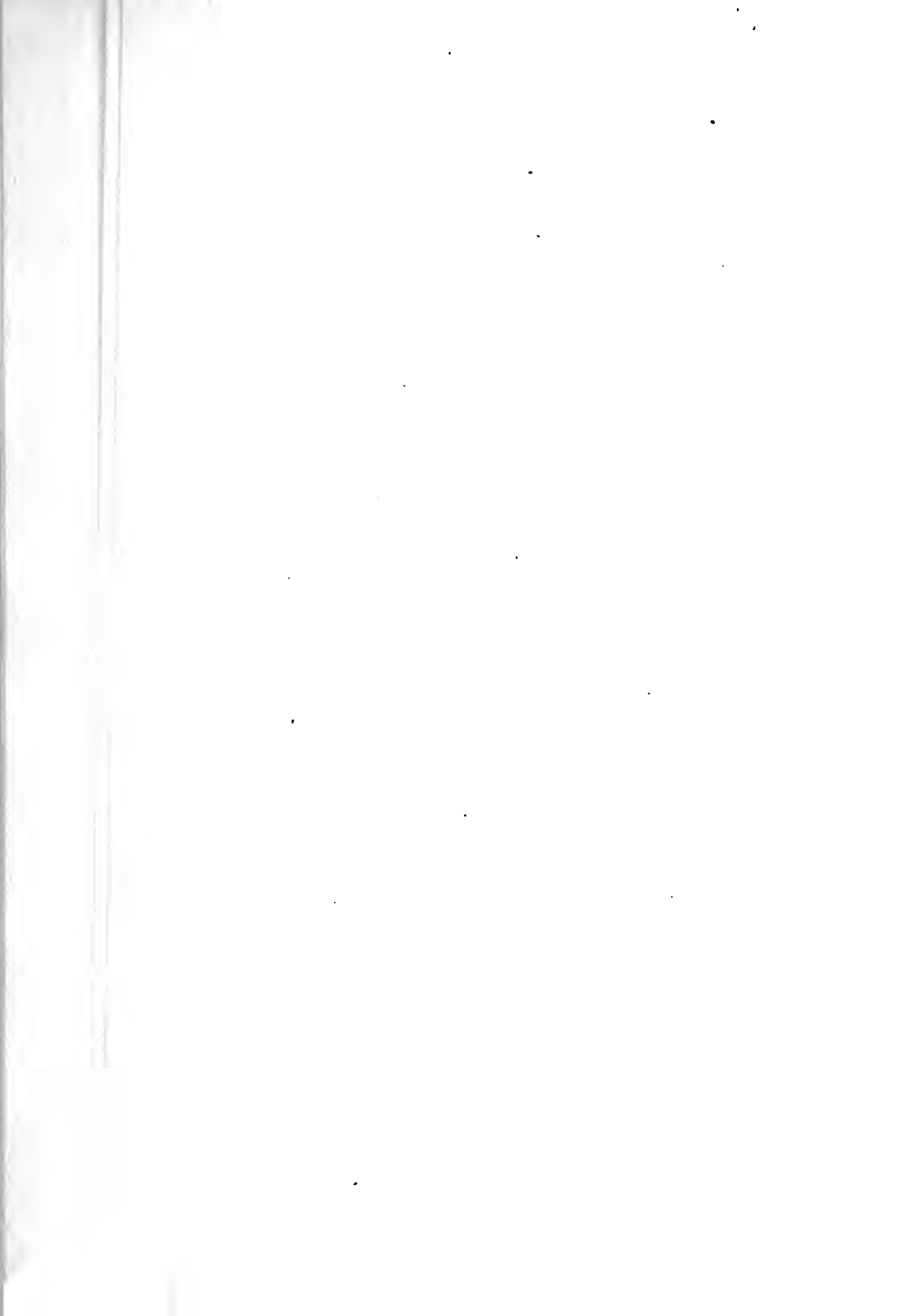
Paragraph 12—Longitudinal Anchorage—(Page 5).

After words "anchoring the tank to the underframe" in second line, substitute "at some one point, rather than by confining it between head blocks, as the necessary play between tank and head blocks too often









results in damage to the head, bending of the underframe at the bolsters, and breakage of the discharge nozzles" for the present wording—"at or between bolsters, rather than by means of head blocks, inasmuch as the latter method results in damage to underframe forward of body bolster." Paragraph would then read:

12. *Longitudinal Anchorage.*—Particular attention must be given to the longitudinal anchorage of the tanks, which must be thoroughly substantial, to prevent injurious end shifting.

The preferable method of securing tank against end shifting is by anchoring the tank to the underframe at some one point, rather than by confining it between head blocks, as the necessary play between tank and head blocks too often results in damage to the head, bending of the underframe at the bolsters, and breakage of the discharge nozzles.

Paragraph 16—Cars without Underframes—(Page 7).

Omit the last sentence "The sectional area of the additional metal in bottom of tank shell must be at least 20 square inches." This requirement is not definite, and a tank that happened to have a thick envelope would have to have an exceedingly wide bottom sheet, whereas a tank which happened to be comparatively thin throughout, would require a very narrow bottom sheet.

Paragraph would then read:

16. *Cars without Underframes.*—If the car has no underframe, the tank shell at bottom must be at least  $\frac{5}{8}$  of an inch thick, and all circumferential seams in bottom sheet, except head seams, must be double riveted.

## SPECIFICATIONS FOR OLD TANK CARS HAVING WOODEN UNDERFRAMES.

Paragraph 1 (Page 9).

Add "tank valve extension clearance, discharge valve" after "tank straps, etc." in fifth line; and omit "axles" in sixth line.

Paragraph would then read:

1. Tank cars having wooden underframes, of railroad or individual ownership, will be required to conform to the requirements of the "Specifications for Ordinary Tank Cars" relating to test of tanks, safety valves, test of safety valves, 5-inch safety vents with lead disks, 2-inch vent hole or small valve with lead disk, dome yokes, tank straps, etc., tank valve extension clearance, discharge valve, brakes, push-pole pockets, trucks, and inspection for compliance with M. C. B. specification, and, in addition, must be as strong as the construction covered by the following detailed specifications:

## SPECIFICATIONS FOR SPECIAL TANK CAR.

Paragraph 7, page 13:

Make this paragraph same as Paragraph 15 — Discharge Valve — in Specification for Ordinary Tank Cars:

7. If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve.

Preferably the top of the discharge-valve handle should be within the tank, but in the event that it is carried through the dome, leakage must be prevented by packing and cap nut.

An alternative arrangement, by which the valve is placed on top of car and the contents of the car discharged by air, will be accepted.

Renumber and re-locate diagrams in specifications.

MM. Are you in favor of the above recommendations?

## FREIGHT-CAR UNLOADING MACHINES.

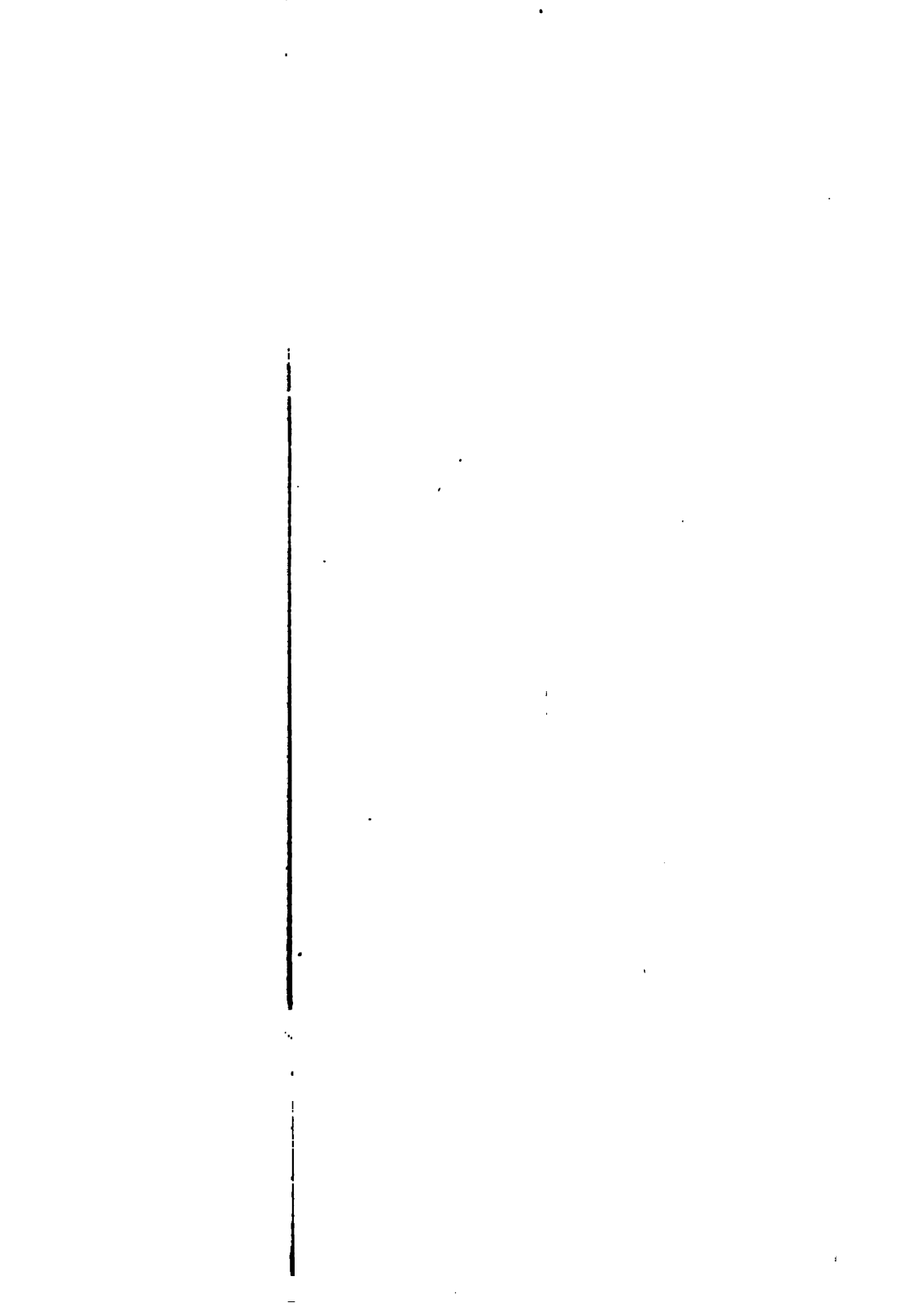
At the convention in June the Committee on Freight Car Equipment by Unloading Machines reported, giving a description of the types of machines, methods of operation, and suggestions for the prevention of damage to cars by their use.

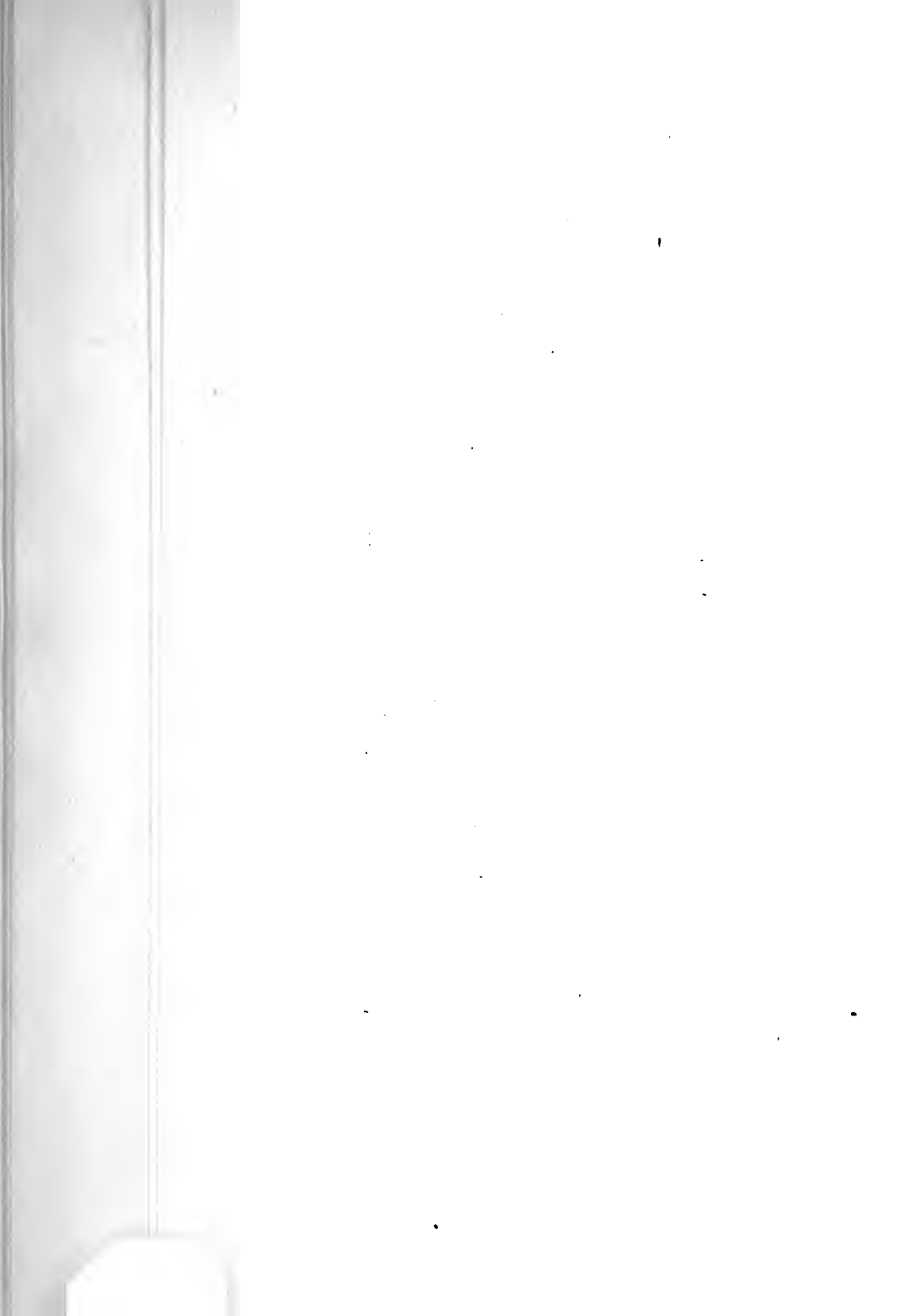
Diagrams of the cradles used, and movement of same with cars are shown. The report of the committee is printed herewith practically in full, that the members may become conversant with the recommendations.

There are two types of car dumpers in use. One in which the track or platen on which the car rests is moved transversely, bringing the side of car against the side of cradle, and which will be referred to in this report as movable-platen type. The other is that in which the track is built solid with the cradle, and cradle side is moved in against car side by means of hydraulic cylinders, and will be referred to in this report as solid-floor type.









## MOVABLE-PLATEN TYPE.

Diagrams of the cradle and movement of same with car is shown on Plate 1. The sequence of positions of car, clamps, extension clamps and chains, are shown in Fig. 1 to Fig. 5, inclusive.

The supporting track on platen has its center coincident with that of the supply track leading to machine, when cradle is at its bottom or normal position, as in Fig. 1, this being controlled by cams underneath the platen. When cradle is raised the cams become disengaged and chains which are attached to platen, and which pass through hollow clamps and extension clamps to counterweights, move the platen transversely, bringing car against side of cradle, as in Fig. 2. As the cradle continues to raise, the hook clamps, which move by their own weight in guides, bear on the top of car and hold car to platen by the combined weight of the clamps. When the cradle rotates to dump the car the extension clamps are brought over the top of car as shown in Figs. 3 and 4, and finally when car is turned completely over, clamps, extension clamps and chains are in position shown in Fig. 5.

## SOLID-FLOOR TYPE.

Diagrams of cradle and method of clamping car is shown on Plate 2. The sequence of clamp operations being shown in Figs. 1 to 4, inclusive, but it must be understood that the sequence of clamp operations can be varied, as the movement of hydraulic pistons is controlled by independent valves. When car is placed on supporting track the pistons A, B, C and D are all in release position, as in Fig. 1. The cradle side is first moved in against top of car by piston B, bringing clamp X over car side and outside. Clamp Y is brought over car side by piston A, as in Fig. 2. Both clamps are next brought down on top of car by piston D, as in Fig. 3. Buffer is then brought out against car by piston C, thus making all clamps in operation, as in Fig. 4, and cradle is then rotated about center N.

With machines of movable-platen type the damage occurs when the cradle of car dumper is rotated, due to their not having proper bearing against the side of cradle, the side of car coming in contact with the clamp housings or side of cradle, and damaging or destroying side ladders, hand-holds, roping staples or door-operating mechanism, and by the absence of extension clamps.

With machines of the solid-floor type the damage is done by hydraulic-operated clamps crushing in sides of car and bending down top of car, and I beam of floor system outside of rail being too high and striking column bolts.

To prevent the damage to cars, the cradle on both types of dumpers should be faced with timber, preferably 10 inches thick, on specified areas

and with openings between said timbers. The timbers are provided for car to rest against when rolled on its side, and the openings are to permit of contents that have fallen into cradle being dumped on the next turn of the cradle. The blocking is so arranged to protect the extending appliances by providing for them in areas not covered with blocking. On the machines of solid-floor type the method of moving cradle side will have to be changed so that the side pressure on car will not be greater than the combined weight of the heaviest car and its contents, and so that the vertical clamping will not exert a pressure on top of car greater than that now used on movable-platen type.

The principal features to be considered in providing the protection for both types of machines are, therefore:

First: Provide as much bearing as possible on cradle side for car and at the same time insure ample clearance for safety appliances and other attachments projecting beyond side stakes of car.

Second: Allow for sufficient variation for spotting cars in cradle, so that time will not be lost in placing cars, with a resulting decrease in the capacity of car dumper. The protection should be so placed that when a car is stopped anywhere within 2 feet said blocking will be ample to support car on its side. A greater allowance than 2 feet is to be preferred when it can be provided without making a supporting area so small that car will be damaged.

Third: Provide blocking so that the bearing face can be quickly renewed, so that it may be maintained in proper condition at all times by applying same when machine is idle, to avoid necessity of shutting down dumper to apply blocking.

Fourth: Provide guide plate at in-bound end of cradle for entering cars with spread sides, as per Plate 4, Figs. 1 and 2.

Fifth: Machine to be provided with not less than four vertical clamps, and each of these to be equipped with extension clamp.

Sixth: Grade of yard track leading into cradle to be of 100 feet radius, to prevent damage to carry irons when cars are moved into machines coupled.

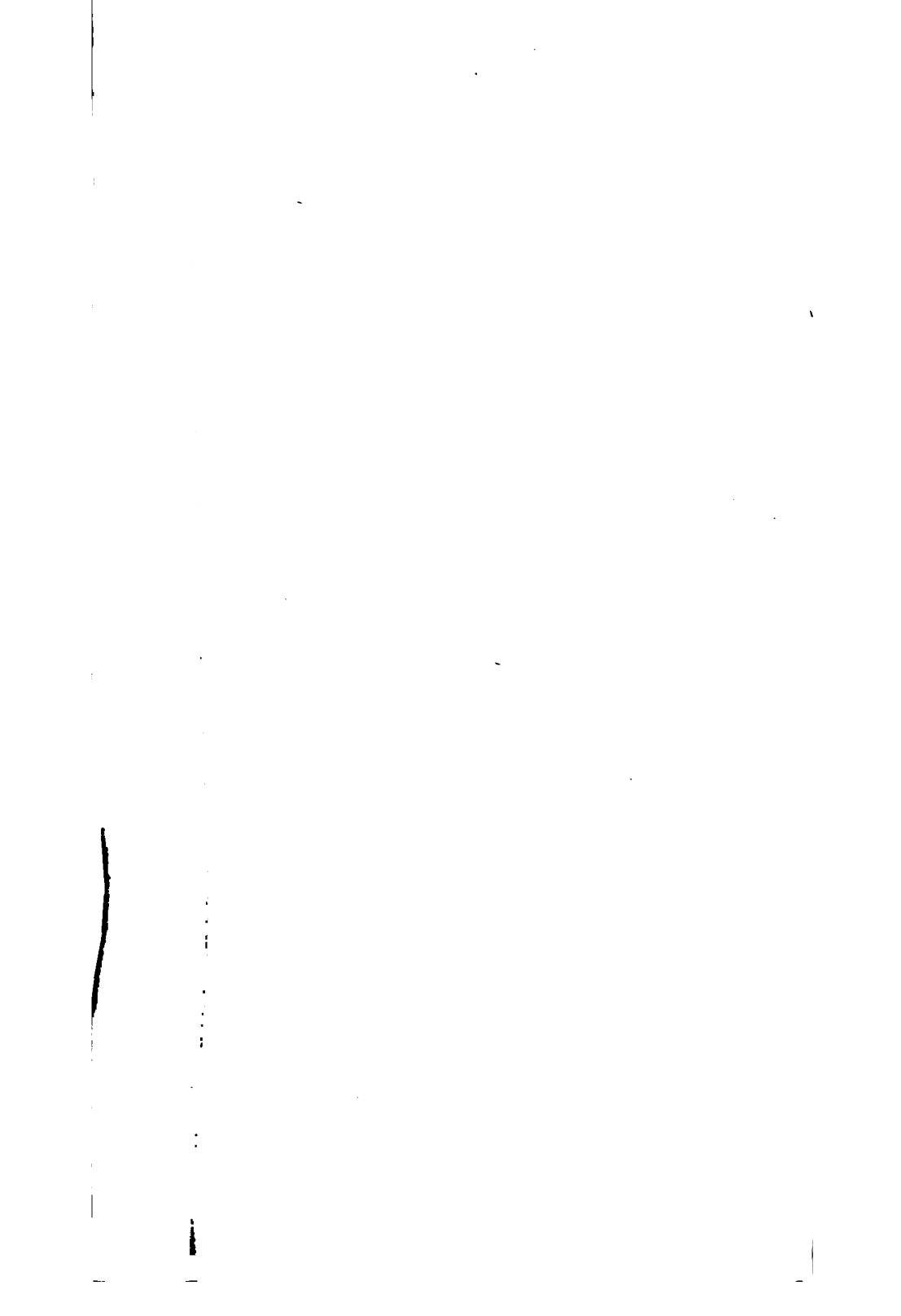
Seventh: Timber lining to be cut at angle at lower ends to permit contents spilled into cradle to get out on next turn of cradle.

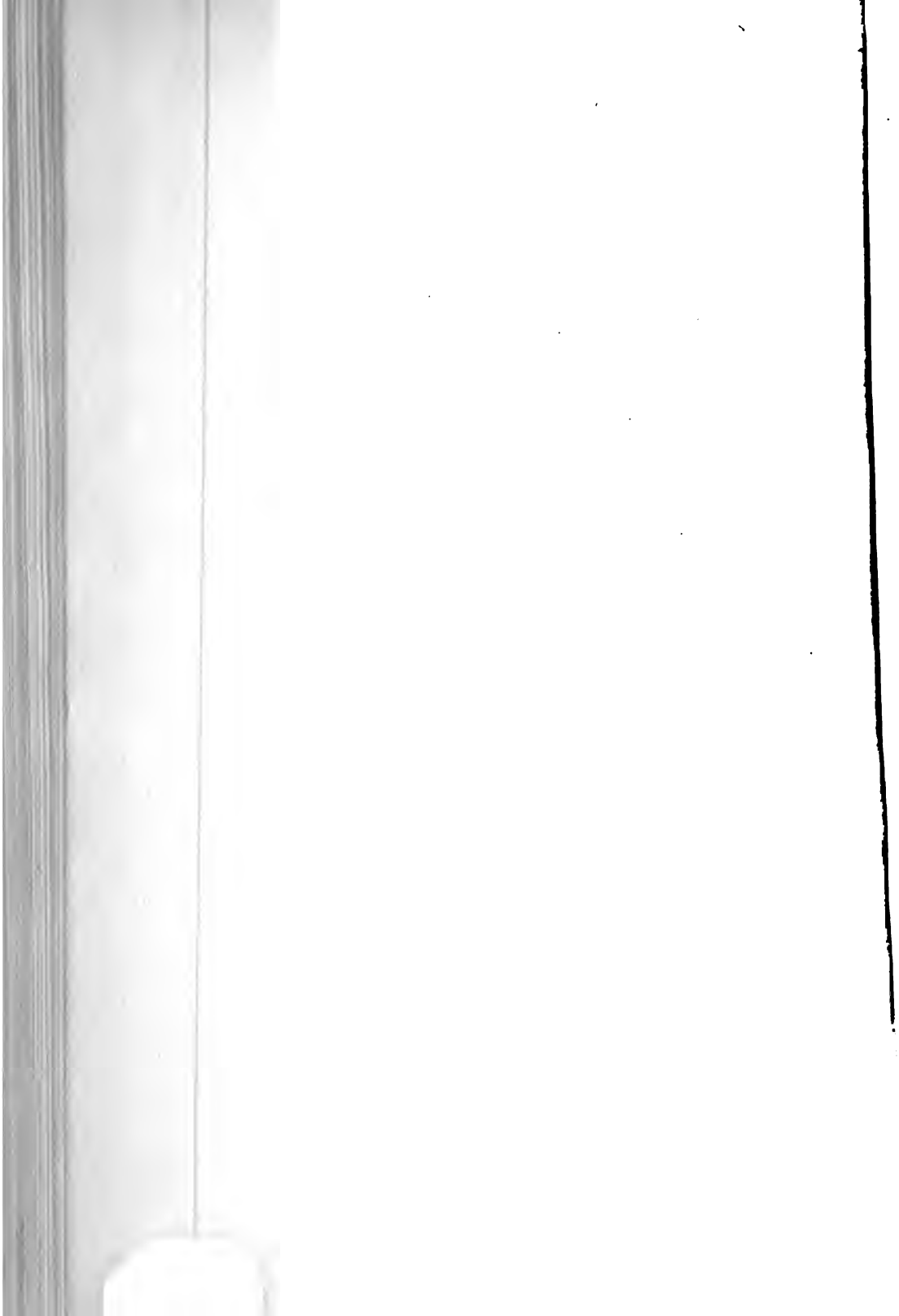
Features to be considered in addition to the above, but only on solid-floor type machines, are:

Eighth: No side pressure to be used which will force car against lining in cradle with a pressure greater than the combined weight of car and contents.

Ninth: Vertical clamps to be operated by gravity so that pressure on top of car will not exceed that now used in movable-platen type machines.

Tenth: Top of I beam in floor system and just outside rail to be made same height as rail.









With the foregoing conditions to meet, your committee finds that to provide a lining or blocking for gondola and hopper cars owned by all railroads, could only result in insufficient support for a great many cars. It is therefore necessary for each railroad to make a study of the cars handled by machines on their lines and apply blocking according to the foregoing principles laid down, and as per typical example below on Plate 3. The modifications for the solid-floor type alone, as given in eighth, ninth and tenth items, will have to be provided for by the machine designers.

Plate 3 is a typical blocking used by the Pennsylvania and Lake Shore & Michigan Southern on machines of the movable-platen type, and we would call your attention to the additional clearance necessary in the Sandusky car dumper to prevent damage to the side wheel operated cars of the Norfolk & Western Ry. If it were not necessary to provide this clearance in this particular machine, a greater bearing could be given cars by cutting the blocking along the lines F G H instead of C D E, along V K L instead of U I J, and along M N instead of O P. Furthermore, the recessed portion below line Q R is for existing vertical handholds, and which surface can be brought out full with the balance of the blocking down to line S T after July 1, 1916, when vertical handholds are no longer permissible, for all horizontal handholds will then pass below the line S T. Attached drawing, Plate 4, also shows manner of applying guide for entering car with bulged sides and method of securing blocking to cradle. In securing blocking, it will be noted the 6-inch timber next to cradle side is secured by  $\frac{3}{4}$ -inch bolts passing through wrought washers recessed into timber and through cradle side. The bearing face, 4 inches thick, is secured by  $\frac{3}{4}$ -inch bolts in the same manner through the permanent timber, as shown in Plate 4, Fig. 3. The same blocking should be applied to the solid-floor type machines after the designers have modified cradle side and clamps as per ninth and tenth items.

In connection with the foregoing, we desire to call attention to the following, and the necessity of each railroad giving same the proper consideration in connection with car dumpers operated by it and by plants along its line.

Composite drawings of all cars to be handled by machines should be prepared and drawings for the blocking furnished to contractor when machine is purchased, in order that he may provide necessary blocking, means of securing same, and reinforcement back of cradle to support the weight of car when on its side.

When designing new cars, that some thought be given as to its use on car-dumping machines.

The providing of protection in accordance with this report should be taken up with plants operating car dumpers along the line of railroad, as much damage is done at steel and other manufacturing plants.

When applying this blocking to existing machines, the back of cradle

wall or side should be reinforced to prevent bulging and making useless the blocking.

Extension clamps through which chains pass must be used at all times to prevent damage to car sides by chains. Face plates must not be used on face of timbers, as cars will slip on metal-plated blocking.

A motion prevailed that the recommendations of the committee be referred to letter ballot for adoption as Recommended Practice.

NN. Are you in favor of the adoption of the recommendations?

### CAR CONSTRUCTION.

The Committee on Car Construction made the following recommendations, which on motion were ordered submitted to letter ballot for adoption as Recommended Practice:

#### EXISTING STEEL OR STEEL-UNDERFRAME CARS.

Existing steel or steel-underframe cars which have less strength than that specified below, should be classed as wooden cars and subject to the same rules for combination defects:

Area of center sills not less than 16 square inches.

Ratio of stress to end strain not more than 0.09.

The length of center or draft sill members, or part of member between braces, to be not more than  $20d$  where "d" is the depth of the member, measured in the direction in which buckling might take place.

OO. Are you in favor of the above recommendation?

#### NEW STEEL OR STEEL-UNDERFRAME CARS.

Area of center sills not less than 24 square inches.

Ratio of stress to end strain not more than 0.06.

The length of center or draft sill members, or part of member between braces, to be not more than  $20d$  where "d" is the depth of the member, measured in the direction in which buckling might take place.

PP. Are you in favor of the above recommendation?

## BOX-CAR END DESIGN AND STRENGTH.

Wooden cars with standard M. C. B. lining should have the ends reinforced with metal construction in accord with diagram No. 1, or its equivalent.

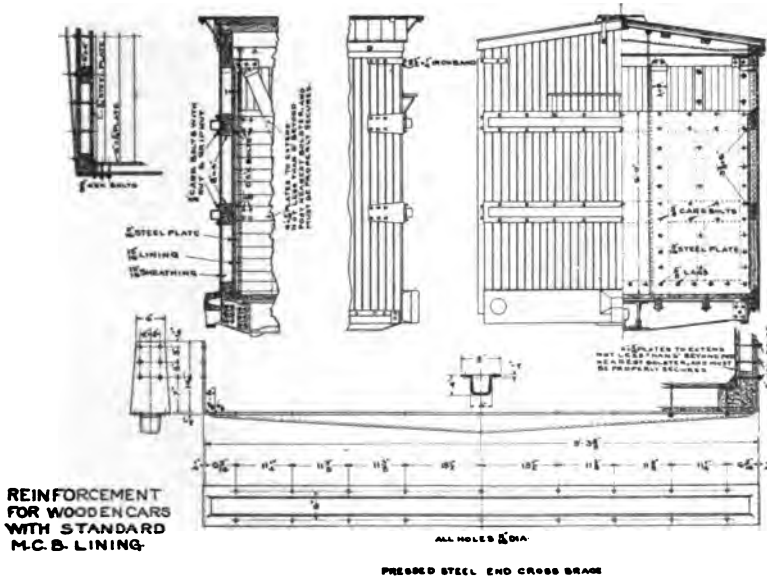


DIAGRAM No. 1.

QQ. Do you favor the above recommendation?

Steel underframe cars with end lining  $1\frac{1}{2}$  inches thick and over should be equipped with outside braces, shown on diagram No. 1, but the inside plate may be omitted.

NOTE.—In applying outside braces, due regard must be given to compliance with United States Safety Appliance Rules for coupler and end ladder clearances.

RR. Do you favor the above recommendation?

Cars with wood superstructure, requiring complete renewal of ends, should have steel ends applied, in accord with diagram No. 2, or its equivalent.

SS. Do you favor the above recommendation?

New cars should be equipped with ends of the type shown on diagrams Nos. 3 and 4. The section modulus of the posts and braces, 2

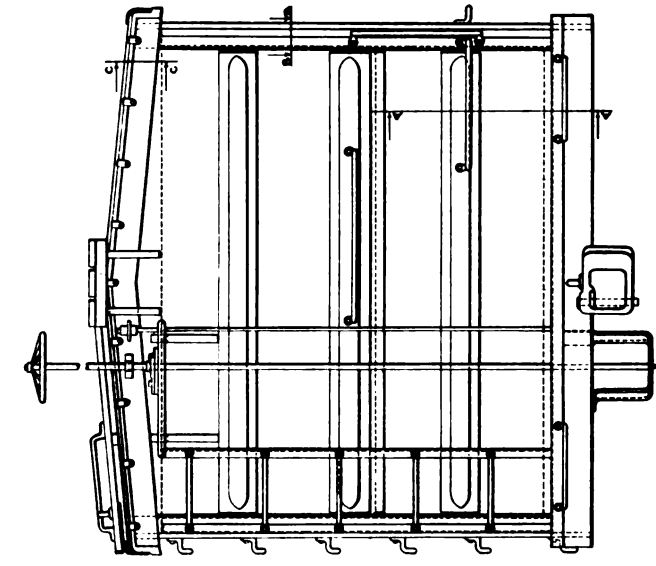


DIAGRAM NO. 2  
ELEVATION  
FOR WOODEN SKELETON  
TO REPLACE BROKEN  
ENDS

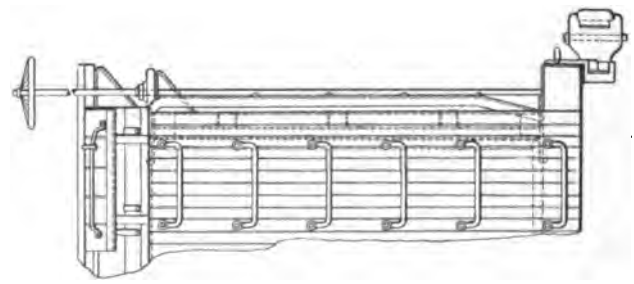
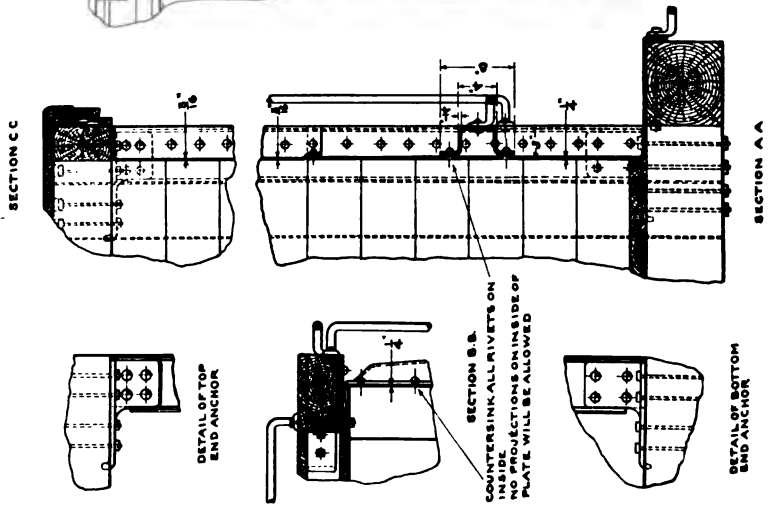
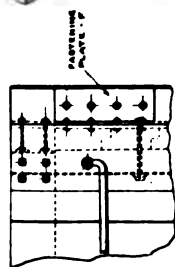


DIAGRAM No. 2.

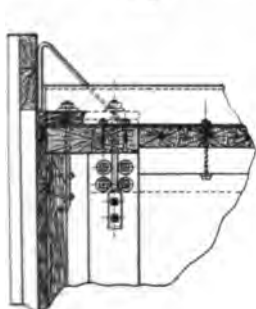


VIEW - E

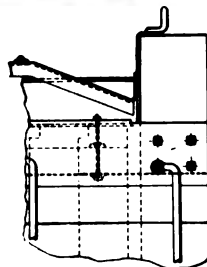
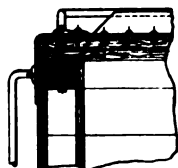


FASTENING PLATE E-P

SECTION B-B

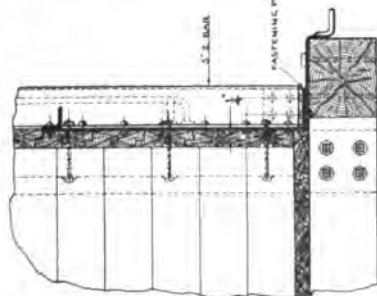


SECTION C-C



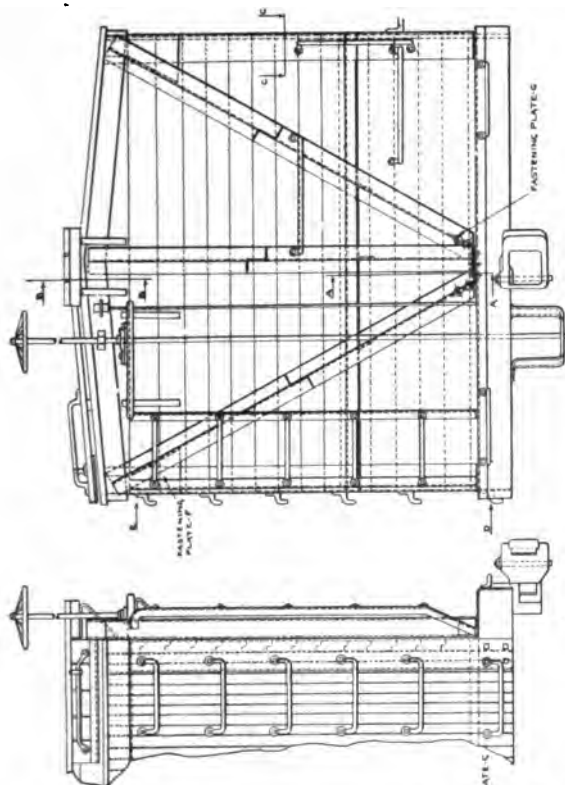
VIEW - B

SECTION A-A



3" B.B.

FASTENING PLATE C



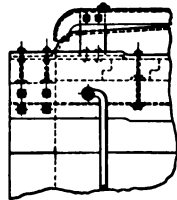
FASTENING PLATE C-P

FASTENING PLATE G

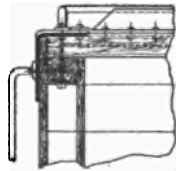
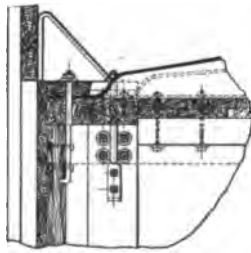
DIAGRAM NO. 3  
CLIPPING NO. 3  
REINFORCEMENT  
FOR NEW CASE

DIAGRAM No. 3.

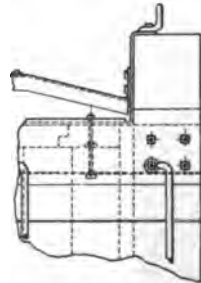
VIEW - E



SECTION B-B



SECTION C-C



VIEW - B

SECTION A-A

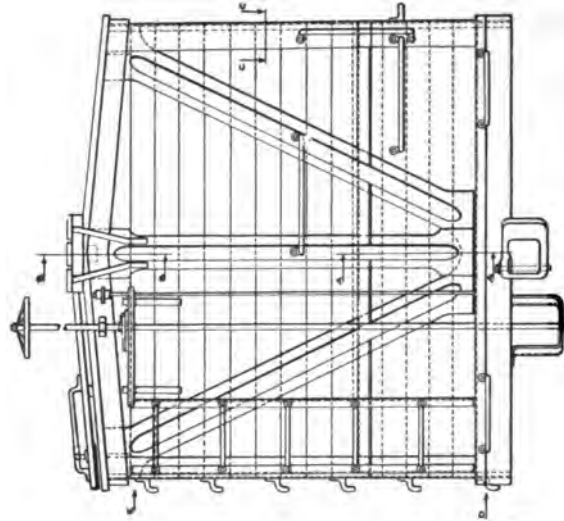
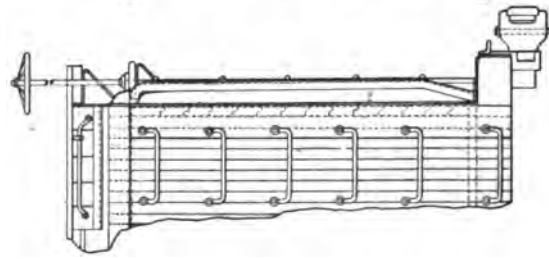
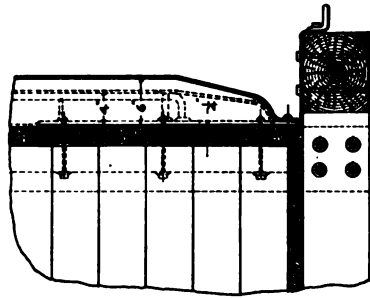


DIAGRAM NO. 4.  
REQUIREMENT  
FOR NEW CAR.

DIAGRAM No. 4.

feet above floor line, not including corner posts or flat end plate, should not be less than 15.

NOTE.—The Murphy or Van Dorn steel ends can be used instead of those shown on diagrams Nos. 1, 2, 3 and 4.

Each end must be attached to the longitudinal car members, either directly or through other members, by fastenings sufficient in strength to develop the full strength of the end.

TT. Do you favor the above recommendation?

#### SEAL RECORDS OF BOX-CAR END DOORS.

(a) End doors used for loading lumber in box cars are essential only on roads having long lumber loading in box cars as an essential feature of traffic.

(b) End doors must be so constructed that when closed they lock automatically, by means of a lock accessible only from the inside of the car, thus avoiding the necessity of taking seal records.

(c) Seal appliances now in use, and not accessible from ground or from end ladders, should be revised so as to be accessible from ground or end ladders, to promote the safety of employees.

UU. Do you favor the above recommendation?

JOS. W. TAYLOR,  
*Secretary.*

# Letter Ballot Voting Slip.

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CHICAGO, ILL., August 13, 1913.

Ballots are to be cast by writing "Yes" or "No" opposite the question on this sheet and mailing it to the Secretary, 390 Old Colony Building, Chicago, Ill.

Ballots will be counted September 14, 1913, and all ballots received after that date will be excluded from the count, as required by the Constitution.

## STANDARDS.

1. Change in dimension of hole in lid for 80,000 and 100,000 journal box. ....
2. Advancing axle E to Standard. ....
3. Spacing for brake-beam heads. ....
4. Details of brake-beam gauges. ....
5. Restoration of guard-arm test. ....
6. Wheel-circumference measure for cast-iron wheels. ....
7. Changes in Loading Rules. ....

## RECOMMENDED PRACTICE.

- A. Designating symbols for cars. ....
- B. Lining for outside-framed cars. ....

C.	Marking freight cars, advance to Standard.	.....
D.	Marking freight cars, revision of.	.....
E.	Addition of word "new" preceding the word "weight" in stenciling cars.	.....
F.	Change in titles of Sheets N, O and P.	.....
G.	End for hopper-door operating shaft.	.....
H.	Maximum side-bearing spacing.	.....
I.	Cars with 10-inch brake cylinders.	.....
J.	Braking power on freight equipment.	.....
K.	Triple valves for freight cars.	.....
L.	Size of brake pipe for passenger cars.	.....
M.	Galvanized brake pipe and fittings for refrigerator and coal cars.	.....
N.	Position of bolting lugs of hose clamps.	.....
O.	Brake beam No. 2.	.....
P.	Specifications for solid wrought-steel wheels.	.....
Q.	Change in illustrations of steel wheels.	.....
R.	Circumference measure for steel wheels.	.....
S.	Journal box, 6 by 11 inch journal.	.....
T.	Journal bearing, 6 by 11 inch journal.	.....
U.	Journal wedge, 6 by 11 inch journal.	.....
V.	Journal-box lid, 6 by 11 inch journal.	.....
W.	Journal-bearing and wedge gauges, 6 by 11 inch journal.	.....

X. Journal box dust-guard gauges, 6 by 11 inch journal.	.....
Y. Journal-box gauges.	.....
Z. Axles for dynamos.	.....
AA. Axle-dynamo suspension.	.....
BB. Wear of metal in axle-dynamo suspension.	.....
CC. Securing of axle-dynamo suspensions.	.....
DD. Location of belt.	.....
EE. A typical design.	.....
FF. Dimensions of battery box.	.....
GG. Design of battery box.	.....
HH. Hanging of battery box.	.....
II. Diameter of pulleys.	.....
JJ. Electric connector.	.....
KK. Specifications for steam-heat hose.	.....
LL. Steam-hose couplings.	.....
MM. Specifications for tank cars.	.....
NN. Freight-car unloading machines.	.....
OO. Area of center sills, existing steel or steel-underframe cars.	.....
PP. Area of center sills, new steel or steel-underframe cars.	.....
QQ. End design, wooden cars.	.....

- RR. End design, steel-underframe cars. ....
- SS. Wooden superstructure requiring complete re-  
newal of ends. ....
- TT. New cars, reinforced. ....
- UU. End doors. ....

Name.....

Title and Road.....

Address.....

## RESULT OF LETTER BALLOT

*To the Members :*

The letter ballot which closed September 14, resulted as follows:

No.	SUBJECT.	Yes.	No.	Total.	Neces- sary to Adop- tion.	Result.
<b>STANDARDS.</b>						
1	Change in dimension of hole in lid for 80,000 and 100,000 journal box.....	1572	272	1844	1229	Adopted.
2	Advancing axle E to Standard...	1841	6	1743	1231	"
3	Spacing for brake-beam heads...	1501	343	1844	1229	"
4	Details of brake-beam gauges...	1558	300	1858	1239	"
5	Restoration of guard-arm test...	1845	18	1863	1242	"
6	Wheel-circumference measure for cast-iron wheels.....	1818	40	1858	1239	"
7	Changes in Loading Rules.....	1451	375	1826	1217	"
<b>RECOMMENDED PRACTICE</b>						
A	Designating symbols for cars....	1640	170	1810	1207	"
B	Lining for outside-framed cars...	1277	482	1759	1173	"
C	Marking freight cars, advance to Standard.....	1224	537	1761	1174	"
D	Marking freight cars, revision of.	1659	145	1804	1203	"
E	Addition of word "new" preceding the word "weight" in stenciling cars.....	1618	210	1828	1219	"
F	Change in titles of Sheets N, O and P. ....	1490	308	1798	1199	"
G	End for hopper-door operating shaft.....	1700	64	1764	1176	"

No	SUBJECT.	Yes.	No.	Total.	Neces- sary to Adop- tion.	Result.
H	Maximum side-bearing spacing..	898	959	1857	1238	Rejected.
I	Cars with 10 inch brake cylinders	1554	257	1811	1207	Adopted.
J	Braking power on freight equip- ment.....	1349	508	1857	1238	"
K	Triple valves for freight cars....	1584	201	1785	1190	"
L	Size of brake pipe for passenger cars.....	1668	46	1714	1143	"
M	Galvanized brake pipe and fit- tings for refrigerator and coal cars.....	1079	763	1842	1228	Rejected.
N	Position of bolting lugs of hose clamps.....	1691	154	1845	1230	Adopted.
O	Brake beam No. 2.....	806	1060	1866	1244	Rejected.
P	Specifications for solid wrought- steel wheels.....	1523	391	1914	1276	Adopted.
Q	Change in illustrations of steel wheel.....	1509	265	1774	1183	"
R	Circumference measure for steel wheels.....	1285	565	1850	1233	"
S	Journal box, 6 by 11 inch journal	1817	4	1821	1214	"
T	Journal bearing, 6 by 11 inch journal.....	1757	64	1821	1214	"
U	Journal wedge, 6 by 11 inch journal.....	1757	64	1821	1214	"
V	Journal-box lid, 6 by 11 inch journal.....	1737	83	1820	1213	"
W	Journal-bearing and wedge gauges, 6 by 11 inch journal..	1757	64	1821	1214	"
X	Journal box dust-guard gauges, 6 by 11 inch journal.....	1797	24	1821	1214	"
Y	Journal-box gauges.....	1811	24	1835	1223	"
Z	Axles for dynamos.....	876	815	1691	1127	Rejected.
AA	Axle-dynamo suspension.....	1306	385	1691	1127	Adopted.

No.	SUB ECT.	Yes.	No.	Total.	Necessary to Adoption.	Result.
BB	Wear of metal in axle dynamo suspension .....	1376	315	1691	1127	Adopted.
CC	Securing of axle-dynamo suspensions.....	1299	335	1634	1089	"
DD	Location of belt.....	1460	187	1647	1098	"
EE	A typical design.....	1128	432	1560	1040	"
FF	Dimensions of battery box.....	809	806	1615	1077	Rejected.
GG	Design of battery box.....	1267	394	1661	1107	Adopted.
HH	Hanging of battery box.....	997	632	1629	1086	Rejected.
II	Diameter of pulleys.....	1400	216	1616	1077	Adopted.
JJ	Electric connector.....	1460	156	1616	1077	"
KK	Specifications for steam-heat hose	1340	63	1403	935	"
LL	Steam-hose couplings.....	1558	117	1675	1117	"
MM	Specifications for tank cars.....	1689	72	1761	1174	"
NN	Freight-car unloading machines.	1539	98	1637	1091	"
OO	Area of center sills, existing steel or steel-under-frame cars.....	862	942	1804	1203	Rejected.
PP	Area of center sills, new steel or steel-underframe cars.....	879	940	1819	1213	"
QQ	End design, wooden cars.....	612	1206	1818	1212	"
RR	End design, steel-underframe cars.....	826	980	1806	1204	"
SS	Wooden superstructure requiring complete renewal of ends.....	530	1303	1833	1222	"
TT	New cars, reinforced.....	788	1045	1833	1222	"
UU	End doors.....	1364	457	1821	1214	Adopted.

JOS. W. TAYLOR,  
Secretary.

# STANDARDS AND RECOMMENDED PRACTICE

OF THE

## MASTER CAR BUILDERS' ASSOCIATION

### GENERAL.

By a letter ballot cast in 1893, the standards of the Association prevailing at that date were modified—

*First.*—By abolishing certain standards because they had either become obsolete or nearly so, or because they were simply forms of gauges for shop use to produce certain other standard forms, and it was believed that such gauges were not essential as standards of the Association, and it had been ascertained that they were not generally used.

The old standards thus abolished were:

Wheel diameter testing gauge.

Wheel flange and journal gauge.

Wheel bore testing gauge.

Wheel boring, use of six dogs.

Journal length and diameter gauge.

Journal shoulder and centering gauge.

Journal distance gauge.

Guard-rail gauge. (Made standard again in 1894.)

Attachments and dimensions of drawbars.

Train-pipe fitting for steam heat.

*Second.*—By ordering that the three items formerly printed at the end of the standards, namely:

Dictionary of terms,

Entertainments,

be printed with the Proceedings as heretofore, but not among the standards.

*Third.*—By dividing the remaining standards into:

(a) Standards of the Association.

(b) Recommended Practice.

These Standards and this Recommended Practice are given under their respective heads in the following pages as modified by letter ballot on these or other subjects, and revised by the ballot of 1894 and subsequent years to date.

New drawings of the Standards and Recommended Practice were ordered made on sheets of uniform size, to be lithographed and printed on transparent paper so that blue-prints might be taken from them; such

sheets to be held for sale by the Secretary in connection with pamphlets containing explanatory text as given in the Proceedings. Reduced copies of these sheets to be bound with the Proceedings in connection with the text of the Standards and Recommended Practice.

## STANDARDS OF THE ASSOCIATION.

### JOURNAL BOX AND DETAILS.

### STANDARD.

For Journals,  $3\frac{3}{4}$  by 7 inches. Sheets M. C. B. 1, 2, 3.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893, and revised in 1894 and 1896. For former action, see Proceedings 1874, page 40; Proceedings 1881, pages 14, 15 and 27.

The revision made in 1894 consisted in correcting the drawing at the top of the journal box, and in leaving off the lugs at sides of arch bars. Also in changing the wedge and bearing so as to make the latter flat on top instead of curved, as theretofore, and in curving the top of the wedge, thus making this construction similar in general arrangement to the standard forms for the  $4\frac{1}{4}$  by 8 inch journal box.

The revision made in 1896 consisted in the elimination of the dust guard from Sheet 1, and the addition of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of the cotter, if preferred, in the hinge pin of the lid. Also in the addition to Sheet 3 of a similar note to the latter, and of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure  $1\frac{1}{8}$  inches long instead of 1 inch long as they were formerly.

One additional note was made on Sheet M. C. B. 1 and two additional notes on Sheet M. C. B. 2 in 1898.

In 1899 the size of bolt hole was increased from 1 inch to 1-16 inches.

In 1905 the addition of a rib  $\frac{3}{8}$  inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908 a dimension of 3-16 inch was shown, it being the distance from the center line of bolt hole to inside bearing face of lid.

### JOURNAL BOX AND DETAILS.

### STANDARD.

For Journals,  $4\frac{1}{4}$  by 8 inches. Sheets M. C. B. 4, 5, 6.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893, and revised in 1896. For former action see Proceedings 1891, pages 142-144.

The revision made in 1896 consisted in the elimination of the dust guard from Sheet 4; also, in removing the arch bar seat lugs from Sheets

4 and 5, and making the arch bar seat  $4\frac{1}{2}$  inches wide. Also, in the addition to Sheet 4 of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of a cotter, if preferred, in the hinge pin of the lid. Also, in the addition to Sheet 6 of a similar note to the latter, and of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure  $1\frac{1}{4}$  inches long instead of  $\frac{3}{4}$  inch long as they were formerly.

One additional note was made on Sheet M. C. B. 4 and two additional notes on Sheet M. C. B. 5 in 1898.

The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top.

In 1905 the addition of a rib  $\frac{3}{8}$  inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908, the inside dust guard was restored at the top and joined to the inside side wall with an opening of  $2\frac{3}{4}$  inches radius, the center being located one inch above the horizontal center line of the box.

In 1908 the distance from center line of box to edge of wedge stop was increased from  $4\frac{5}{8}$  inches to 4 11-16 inches to allow  $\frac{1}{8}$  inch clearance between wedge and stop.

In 1909 the vertical clearance of 1-16 inch between the side lugs on the journal bearing and the journal wedge was increased to  $\frac{1}{8}$  inch, to conform with the other standard journal boxes, the side lugs being reduced from  $\frac{7}{8}$  inch to 13-16 inch.

#### JOURNAL BOX AND DETAILS.

#### STANDARD.

For Journal, 5 by 9 inches. Sheets M. C. B. 7, 8 and 9.

The journal box and details shown in these drawings were adopted as recommended practice in 1896. In 1898 they were adopted as standards of the Association.

In 1900 the opening at the back end of box, corresponding with the dust guard, was increased from 3 3-16 inches to  $3\frac{3}{8}$  inches radius, making the opening  $6\frac{3}{4}$  inches wide instead of  $6\frac{1}{8}$  inches, the height remaining unchanged.

The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top.

In 1902 the wedge stop lugs were increased in size and extended laterally to the sides of box.

In 1905 the addition of a rib  $\frac{3}{8}$  inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius, with the center located 1 inch above the horizontal center line of the box. The opening in the outside wall was enlarged at the side and struck with a 4-inch radius all around. The distance from the center of the box to the inside of the lug for the

journal bearing key located in the top wall of the box was increased to 5 3-16 inches. The width of the inside side lugs for the journal bearings was decreased to 2 5/8 inches.

In 1908 the center of box from which the lower half of the circle is struck was raised 1/4 inch, increasing the depth to 1 5/8 inches.

In 1909 the vertical clearance of 1-16 inch between the side lugs of journal bearing and wedge was increased to 3/8 inch, to conform to the other standard boxes, the side lugs being reduced from 1 1/4 to 1 1-16 inches.

In 1909 the dust-guard opening in this box was modified, and words "cast steel" were omitted from the drawing of the wedge.

In 1912 the wedge was changed in design to provide increased bearing surface against side lugs.

In 1913 the distance from inside face of lid to center of pin hole was changed from 3/2 inch to 1 1/4 inch.

#### JOURNAL BOX AND DETAILS.

#### STANDARD.

For Journals, 5 1/2 by 10 inches. Sheets M. C. B. 10, 11 and 12.

The journal box and details shown in these drawings were adopted as standard in 1900.

In 1901 the inner dust-guard wall at the top was cut out entirely to avoid all danger of the journal bearing striking the wall of the box at the rear.

In 1902 the wedge stop lugs were extended laterally to the sides of box.

In 1903 the radius of the dust-guard opening was changed to 3 3/4 inches, and the diameter to 7 1/4 inches to allow proper play for the wheel fit.

In 1905 the addition of a rib 3/8 inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius located 1 1/2 inches above the horizontal center line of the box. The opening in the outside back wall was enlarged at the side and struck with two 4-inch radii, the lower one-half having its center line on the center line of box, the center of the upper one-half being 1/4 inch above the center line of the box. The distance from center of the box to the inside of the lug for the journal box key was increased to 5 11-16 inches. The width of the inside side lugs for journal bearings was decreased to 2 5/8 inches.

In 1908 the distance from center line of box to face of wedge stop was increased from 5 11-16 inches to 5 3/4 inches, thus allowing 3/8 inch clearance between wedge and stop.

In 1908 the note reading "the total lateral [extreme positions of axle] equals 3/8 inch," was eliminated.

In 1909 the word "malleable" was stricken out and the words "drop-forged" substituted for journal bearing wedge.

In 1911 the use of pressed or cast steel for journal box was authorized and reduction in thickness of metal and coring to lighten weight permitted, provided that the essential dimensions affecting interchangeability and the fitting of contained parts are adhered to.

In 1911 the notes on Sheet M. C. B. 11 referring to placing of letters "M. C. B." on top of box was changed from "arch bar seat" to "seat of truck sides."

In 1912 the wedge was changed in design to provide increased bearing surface against side lugs.

In 1913 the distance from inside face of lid to center of pin hole was changed from  $3\frac{1}{2}$  inch to  $1\frac{1}{8}$  inch.

#### JOURNAL BOX AND DETAILS.

#### RECOMMENDED PRACTICE.

For Journals, 6 by 11 inches. Sheets M. C. B.—A, A<sup>1</sup> and A<sup>2</sup>.

The journal box and details shown in these drawings were adopted as Recommended Practice in 1913.

#### PASSENGER CAR JOURNAL BOX AND CONTAINED PARTS.

#### STANDARD.

For Journals,  $4\frac{1}{4}$  by 8 inches. Sheet M. C. B. 13.

In 1898 a Recommended Practice was adopted for passenger car journal box and contained parts for journals  $4\frac{1}{4}$  by 8 inches. In 1901, as a result of letter ballot, this was changed to Standard, and is now shown on Sheet M. C. B. 13.

#### PASSENGER CAR JOURNAL BOX AND CONTAINED PARTS.

#### STANDARD.

For Journals, 5 by 9 inches. Sheet M. C. B. 8-A.

In 1911 the mouth and dust guard opening was changed to conform to similar journal box for freight car, and advanced to standard.

### JOURNAL BEARING AND WEDGE GAUGES.

#### JOURNALS, $3\frac{3}{4}$ BY 7, $4\frac{1}{4}$ BY 8, 5 BY 9 AND $5\frac{1}{2}$ BY 10 INCHES

#### STANDARD.

Sheet M. C. B. 14.

In 1900 gauges for journal bearings and wedges for journals 5 by 9 inches and  $5\frac{1}{2}$  by 10 inches were adopted as standard.

In 1903 gauges for journal bearings and wedges for journals  $3\frac{3}{4}$  by 7 inches and  $4\frac{1}{4}$  by 8 inches were advanced from recommended practice to standard. They are shown on Sheet M. C. B. 14.

JOURNALS, 6 BY 11 INCHES.

RECOMMENDED PRACTICE.

Sheet M. C. B.—A<sup>3</sup>.

In 1913 gauges for journal bearings and wedges for journals 6 by 11 inches were adopted as Recommended Practice.

## AXLES.

In 1899 it was decided that the standard axles should be known by letters.

In 1901 a designation was given the standard axles, whereby each shall be known to carry a definite weight instead of for cars of particular capacity. See Sheet M. C. B. 15.

AXLE.—A.

STANDARD.

With Journals,  $3\frac{3}{4}$  by 7 inches. Sheet M. C. B. 15.

Designed to carry 15,000 pounds.

This axle is the standard of the Association for cars of 40,000 pounds capacity.

In 1873 a standard for car axle was recommended, the form and dimensions of which, excepting the diameter in the middle, were substantially the same as shown in this sheet. In 1884 the diameter at the middle was increased from  $3\frac{7}{8}$  inches to  $4\frac{1}{4}$  inches, by letter ballot.

In 1901 the diameter of wheel seat was changed from  $4\frac{7}{8}$  to  $5\frac{1}{4}$  inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing location of the borings to be taken from steel axles for analysis. See Sheet M. C. B.—A.

In 1902 further changes were made in the diameter of the tapered portion where it joins the fillet next to the rough collar; also in the diameter of the rough collar.

For action of the Association see Proceedings 1876, page 99; Proceedings 1878, page 129; Proceedings 1879, page 103; Proceedings 1880, page 130; Proceedings 1884, pages 156-162.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to  $\frac{3}{4}$  inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to  $\frac{1}{4}$  inch.

## AXLE—B.

## STANDARD.

With Journals,  $4\frac{1}{4}$  by 8 inches. Sheet M. C. B. 15.

Designed to carry 22,000 pounds.

This axle was adopted as a standard of the Association for cars of 60,000 pounds capacity, by letter ballot, in 1889; see Proceedings 1889, pages 88-109.

In 1901 the diameter of wheel seat was changed from  $5\frac{3}{8}$  inches to  $5\frac{3}{4}$  inches.

In 1901 a notation was added to the drawing of this axle, showing a straight taper between certain points on the axle; also a diagram showing location of borings to be taken from steel axles for analysis.

In 1901 the diameter of the middle was increased from  $4\frac{3}{8}$  inches to  $4\frac{3}{4}$  inches.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to  $\frac{3}{4}$  inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to  $\frac{1}{4}$  inch.

In 1910 the radius of dust-guard fillet was increased from  $\frac{1}{4}$  inch to  $\frac{3}{4}$  inch, and the wheel seat fillet from  $\frac{3}{4}$  inch to  $\frac{5}{8}$  inch.

## AXLE—C.

## STANDARD.

With Journals, 5 by 9 inches. Sheet M. C. B. 15.

Designed to carry 31,000 pounds.

This axle was adopted as recommended practice in 1896, and was made a standard of the Association in 1898.

In 1901 the diameter of wheel seat was changed from  $6\frac{3}{8}$  inches to  $6\frac{1}{2}$  inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing the location of borings to be taken from steel axles for analysis.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar, also in the diameter of the rough collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to  $\frac{3}{4}$  inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to  $\frac{1}{4}$  inch.

In 1910 the radius of the dust-guard fillet was increased from  $\frac{1}{4}$  inch to  $\frac{3}{4}$  inch.

AXLE.—D.

STANDARD.

With Journals,  $5\frac{1}{2}$  by 10 inches. See M. C. B. 15.

Designed to carry 38,000 pounds.

This axle was adopted as a standard of the Association in 1899.

In 1901 the diameter of wheel seat was changed from  $6\frac{1}{4}$  inches to 7 inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing the location of borings to be taken from steel axles for analysis.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar; also in the diameter of the rough collar.

In 1906 a  $\frac{3}{4}$ -inch radius was adopted between the wheel fit and the rough collar adjoining the inside hub of the wheel; also the radius between the dust guard and wheel fit was increased to  $\frac{1}{4}$  inch.

In 1907 the center from which the radius of  $\frac{3}{4}$  inch is struck was made coincident with the inside face of the hub of the wheel.

In 1910 the radius of the dust-guard fillet was increased from  $\frac{1}{4}$  inch to  $\frac{3}{4}$  inch.

AXLE E.

STANDARD.

Sheet M. C. B. 15.

With journals 6 by 11 inches, Sheet M. C. B.—B. Designed to carry 50,000 pounds.

In 1910 an axle of the design and carrying capacity shown on Sheet M. C. B.—B was adopted as Recommended Practice. Advanced to Standard in 1913.

#### SPECIFICATIONS FOR IRON AXLES.

#### RECOMMENDED PRACTICE.

In 1899 the following specifications, including tests for iron axles, were adopted as Recommended Practice:

Car axles for the use of this company will be ordered subject to the following conditions:

1. All axles must conform in shape and size to the dimensions shown on the blue-prints, which will be furnished by the..... R. R. Co.
2. All axles must be cut off and faced to exact lengths, and be centered with 60 degree centers in the manner indicated in blue-prints, so as to prevent lathe centers from bottoming. Axles must be made of double-

work fagoted scrap, 16 per cent of new bar iron worked into the center of the axles being allowed if desired. Axles must be well hammered and free from any clearly defined open seams. They must finish in the lathe with journal free from flaws in the shape of holes, pieces shelled out, or open seams large enough, so that with a knife blade scale or dirt can be removed from such seams, or open seams showing a clear opening of 1-32 inch or over, and being more than 1 inch long. The maker's name or initials must be stamped plainly on each axle.

3. All axles are to be inspected and tested at the works where they are made. The.....shall be notified when they are ready for inspection. Under no circumstances shall car axles be shipped from the works where they are made until they have been tested, inspected and accepted by a proper representative of the company.

4. For each one hundred axles or fraction thereof ordered, one additional axle must be furnished for test. This axle will be selected at random from the pile, and subjected to the prescribed drop test for iron axles of its class. If it stands the test the one hundred axles, or fractional part thereof that it represents, will be inspected, and only those accepted that are made in a workmanlike manner and are free from defects mentioned in these specifications. All axles received are subject to rejection if they do not finish in the lathe in accordance with the requirements herein given. The manufacturer must furnish, free of charge, the axles that are to be tested, the testing apparatus, and the assistance necessary to enable the inspector to make a satisfactory inspection and test. Axles will not be accepted if the diameters fall below the dimensions for forged sizes given in the blue-prints, or if exceeding those dimensions by more than  $\frac{1}{8}$  inch. Car axles in the rough must not have less than the prescribed minimum weight, nor more than the prescribed maximum weight for axles of their class.

#### AXLE DROP TEST.

##### Sheet M. C. B.—I.

5. All axles will be tested physically by drop test. The testing machine must conform in its essential parts to the drawings adopted by the Master Car Builders' Association. These essential parts are: The points of supports on which the axle rests during tests must be three (3) feet apart from center to center; the tup must weigh 1,640 pounds; the anvil, which is supported on springs, must weigh 17,500 pounds; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on drawing, and the radius of the supports and of the striking face on the tup in the direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must be turned over after the first and

third blows, and when required after the fifth blow. After the first blow the deflection of the axle under test will be measured in the manner specified below.

6. It is desired that the axles when tested as specified above shall stand the number of blows at the heights specified in the following table without rupture, and without exceeding, as the result of the first blow, the deflections given:

AXLE.	NO BLOWS.	HEIGHT OF DROP.	DEFLECTION.
M. C. B. $4\frac{1}{4}$ by 8 inch journals....	5	21 $\frac{1}{2}$ ft.	7 $\frac{1}{2}$ in.
M. C. B. 5 by 9 inch journals.....	5	29 ft.	6 $\frac{1}{4}$ in.
M. C. B. $5\frac{1}{2}$ by 10 inch journals...	5	36 ft.	5 $\frac{1}{4}$ in.

7. Axles will be considered as having failed on drop test and will be rejected if they rupture or fracture in any way, or if the deflection resulting from the first blow exceeds the following:

M. C. B. axle,  $4\frac{1}{4}$  by 8 inch journals..... 8 1-8 inches.

M. C. B. axle, 5 by 9 inch journals..... 8 1-16 inches.

M. C. B. axle,  $5\frac{1}{2}$  by 10 inch journals..... 6 1-16 inches.

In order to measure the deflection, prepare a straight-edge as long as the axle by reinforcing it on one side, equally at each end, so that when it is laid on the axles the reinforced parts will rest on the collars of the axle, and the balance of the straight-edge not touch the axle at any place. Next place the axle in position for test, lay the straight-edge on it, and measure the distance from the straight-edge to the axle at the middle point of the latter. Then, after the first blow, place the straight-edge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the straight-edge at the point farthest away from the latter. The difference of the two measurements is the deflection.

#### SPECIFICATIONS FOR STEEL AXLES.

#### RECOMMENDED PRACTICE.

##### Sheet M. C. B.—B.

In 1899 the following specifications, including tests for steel axles, were adopted as Recommended Practice:

1. Axles will be ordered not less than 100 on one order. All axles must be made and finished in a workmanlike manner, and must be free from cracks, or seams, or flaws which can be detected by the eye. All parts must be rough turned, except at point "A" on diagram below.

2. All axles must be made of steel, and the material desired have the following composition:

Carbon .....	0.40 per cent.
Manganese, not above.....	0.50 per cent.
Silicon .....	0.05 per cent.
Phosphorus, not above.....	0.05 per cent.
Sulphur, not above.....	0.04 per cent.

3. All axles must conform in sizes, shapes and limiting weights to the requirements given on the order or print sent with it. The rough turning must be done with a tool so shaped as to leave the surface free from ridges; and in centering them 60-degree centers must be used with proper clearance for lathe centers. All axles must be legibly stamped when offered for test, on the unfinished portion, "A" on diagram below, with the blow or heat number and the date, and on the cylindrical portion at center they must be stamped with the name of the maker.

*Portions marked "A" to be unfinished and to have stamped upon either of them blow number and date.*



4. Manufacturers must notify..... when they are ready to ship not less than 100 axles; must have all the axles made from each heat, and no others, in a pile by themselves; must furnish the testing machine referred to in Section 6, and the proper appliances for checking the dimensions and weights; must have a car or cars ready to receive shipment; must furnish the labor and power necessary to enable the inspector to promptly inspect and test; and ship or store the axles when tests are finished. Axles which, when offered for test, are so rusty as to hide defects will not be considered.

5. A shipment of axles being ready for test, the inspector will first make a list of the heat numbers in the various piles of axles offered, and the number of axles bearing the same heat number in each pile. If he finds in any pile axles bearing different heat numbers he must, before going further, have the pile rearranged, so that only those axles having the same heat number will be in the same pile. Also, if he finds in any pile any axles having evidence of changed or defaced heat numbers, or any axles having heat numbers not clearly legible, or any bearing heat numbers previously rejected, he will exclude such axles from further consideration. He will then examine the axles in each pile or heat, as to workmanship and defects visible to the eye, and as to whether they conform to dimensions and directions on the order, or tracing, or in these specifications. All axles not satisfactory in these respects must be laid aside and will not be further considered. This being done, if less

than thirty axles in any heat are left, he will refuse to consider that heat further. If in this inspection defects are found which the manufacturer can remedy while the inspector is at the works, he may allow such defects to be cured and may count the axles which are successfully treated in this way as a part of the thirty above mentioned. Not less than thirty axles from any one heat having passed the foregoing inspection, the inspector will select from each pile or heat, one axle at random, and subject it to the physical test prescribed for such axles as may be under consideration. If the test axle fails to fill the physical requirements, all the axles from that heat of steel will be regarded as rejected, and none of them will at any time be considered again. If the test axle passes physical test, the inspector will draw a straight line parallel with the axis of this test axle ten (10) inches long, starting from one end of it, and prick-punch this line at several points. He will then have a piece about six (6) inches long cut off from the same axle, so as to leave some of the prick-punch marks on each piece of the axle. The 6-inch piece must be sent at once, properly tagged, to..... The piles of axles which have passed physical test will be allowed to remain as the inspector leaves them, until the results of the chemical test are known. The 6-inch piece being received at the laboratory, a line will be drawn from the prick-punch line above described, through the center of the axle across the cut-off end, and a prick-punch mark made on this last line, 40 per cent of the distance from the center to the circumference of the axle. Borings for analysis will be taken by means of a  $\frac{5}{8}$ -inch diameter drill, acting parallel to the axis of the axle, and starting with its center in the last described prick-punch mark. The borings will be analyzed in accordance with standard methods, and the results of analysis will be communicated to the inspector, who will at once proceed to the works, and reject, or accept and ship, or mark and store, as the case may be, the axles in question. If the analysis of any test axle shows that the steel does not meet the chemical requirements, all of the axles of that heat will be regarded as rejected, and none of them will at any time be considered again. If the analysis of any test axle shows that the steel meets the chemical requirements, all of the axles of that heat which have passed inspection and physical test will be regarded as accepted. The inspector will proceed to load and ship from the accepted axles as many as may be required to fill the order. If, as the result of inspection and the physical and chemical tests, more axles are accepted than the order calls for, such accepted axles in excess will be stamped by the inspector with his own name, and will then be piled and allowed to remain at the works, subject to further orders from the purchasing agent. On receipt of further orders, axles once accepted will, of course, not be subject to further test, but in no case will even accepted axles be loaded and shipped except in the presence of the inspector. In all cases the inspector will keep an accurate record of the heat numbers, of the number of axles in each heat which are rejected, or stored, and will transmit this information with each report.

6. All axles will be tested physically by drop test. The testing machine must conform in its essential parts to the drawings adopted by the Master Car Builders' Association. These essential parts are: The points of supports on which the axle rests during tests must be three feet apart from center to center; the tup must weigh 1,640 pounds; the anvil, which is supported on springs, must weigh 17,500 pounds; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on drawing; and the radius of supports and of the striking face on the tup in the direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must be turned over after the first and third blows, and when required, after the fifth blow. After the first blow, the deflection of the axle under test will be measured in the manner specified below.

7. It is desired that the axles, when tested under the drop test as specified above, shall stand the number of blows at the height specified in the following table without rupture and without exceeding as the result of the first blow the deflections given:

AXLE.	NO. BLOWS.	HEIGHT OF DROP.	DEFLECTION.
M. C. B. $4\frac{1}{4}$ by 8 inch journals for 60,000-pound cars.....	5	34 feet	7 inches
M. C. B. 5 by 9 inch journals for 80,000-pound cars.....	5	43 "	$5\frac{1}{4}$ "
M. C. B. $5\frac{1}{2}$ by 10 inch journals for 100,000-pound cars.....	7	43 "	4 "

8. Axles will be considered as having failed on physical test and will be rejected if they rupture or fracture in any way, or if the deflection resulting from the first blow exceeds the following:

M. C. B. axle,  $4\frac{1}{4}$  by 8 inch journals.....  $7\frac{1}{2}$  inches.

M. C. B. axle, 5 x 9 inch journals.....  $6\frac{1}{4}$  inches.

M. C. B. axle,  $5\frac{1}{2}$  by 10 inch journals.....  $4\frac{1}{2}$  inches.

9. Axles will be considered to have failed on chemical test and will be rejected if the analysis of the borings taken as above described gives figures for the various constituents below, outside the following limits, namely:

Carbon.....below 0.35 per cent, or above 0.50 per cent.

Manganese .....above 0.60 per cent.

Phosphorus .....above 0.07 per cent.

In order to measure the deflection, prepare a straight-edge as long as the axle, by reinforcing it on one side, equally at each end, so that when it is laid on the axle, the reinforced parts will rest on the collars of the axle, and the balance of the straight-edge not touch the axle at any place.

Next place the axle in position for test, lay the straight-edge on it and measure the distance from the straight-edge to the axle at the middle point of the latter. Then, after the first blow, place the straight-edge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the straight-edge at the point farthest away from the latter. The difference in the two measurements is the deflection.

## DUST GUARDS.

STANDARD.

## Sheet M. C. B. 15.

In 1909 standard dimensions for dust guards were adopted for the four standard journal boxes. See Sheet M. C. B. 15.

## DUST GUARDS.

RECOMMENDED PRACTICE.

Sheet M. C. B.—A<sup>3</sup>.

In 1913 dimensions for dust guards for 6 by 11 inch journal box were adopted as Recommended Practice.

## FORM OF WHEEL TREAD AND FLANGE.

STANDARD.

## Sheet M. C. B. 16.

A form of wheel tread and flange was adopted as a standard of the Association, by letter ballot, in 1886. For action of the Association see Proceedings 1882, pages 178 and 179; Proceedings 1886, page 68.

In 1906 a design of wheel tread and flange was adopted as Recommended Practice, having an increase of  $\frac{1}{8}$  inch on the flange, and a taper in the tread of one in twenty. In 1907 this was advanced to standard, and is shown on Sheet M. C. B. 16. Modified 1909.

In 1910 a maximum allowable height of flange for cast-iron wheels of  $1\frac{1}{2}$  inches was adopted as standard.

## TERMS AND GAUGING POINTS FOR WHEELS AND TRACK.

STANDARD.

## Sheet M. C. B. 16.

Standard terms and gauging points for wheels and track were adopted in 1894 as follows:

- 1.—TRACK RAILS are the two main rails forming the track.
- 2.—GAUGE OF TRACK is the shortest distance between the heads of track rails.
- 3.—BASE LINE, for wheel gauges, is a line parallel to the axis of the wheels drawn through the point of intersection of tread with a line perpendicular to the axis, and passing through the center of the throat curve.

4.— **INSIDE GAUGE OF FLANGES** is the distance between backs of flanges of a pair of mounted wheels measured on the base line.

5.— **GAUGE OF WHEELS** is the distance between the outside face of flanges of a pair of mounted wheels measured on a line parallel to the base line, but  $\frac{5}{8}$  inches farther from the axis of the wheels.

6.— **THICKNESS OF FLANGE** is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gauge of flanges," and the other drawn through the point of measurement of "gauge of wheels."

7.— **WIDTH OF TREAD** is the distance measured parallel to the base line from a line perpendicular thereto, drawn through the point of measurement of "gauge of wheels" to the outer edge of tread.

8.— **CHECK GAUGE DISTANCE** is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gauge of flanges" on either wheel, and the other drawn through point of measurement of "gauge of wheels" on mate wheel.

9.— **OVER ALL GAUGE** is the distance parallel to base line from outer edge of one wheel to the outer edge of mate wheel.

The above mentioned wheel gauge distances are either directly or by inference as follows:

	Feet.	Inches.
Inside Gauge of Flanges.....	4	5 7-32
Gauge of Wheels.....	4	7 11-16
Thickness of Flange.....	..	1 11-32
Width of Tread.....	..	4 11-32
Check Gauge Distance.....	4	6 29-64
Over All Gauge.....	5	4 3/8

Modified 1909.

GUARD-RAIL AND FROG WING GAUGE.

STANDARD.

Sheet M. C. B. 16.

The guard-rail and frog wing gauge were adopted as standard in 1894, to define the dimensions of track-to which M. C. B. standard wheel and flange gauges have been made to conform. Modified 1907. Modified 1909.

**DISTANCE BETWEEN THE BACKS OF THE FLANGES OF CAR WHEELS. STANDARD.**

In 1883 the standard distance between the backs of flanges of car wheels was made 4 feet 5  $\frac{1}{8}$  inches. See Proceedings 1883, pages 55, 118-120.

In 1885 it was decided by letter ballot that in fitting wheels on axles a variation of  $\frac{1}{8}$  inch each way from the standard distance between flanges

would be allowed. See Proceedings 1885, pages 111-119. Drawing revised in 1896.

In 1907 this standard distance was made 4 feet 5 $\frac{1}{4}$  inches, owing to increase in width of wheel flange. Modified 1909.

In 1909 the minimum distance between the backs of flanges at base line of tread was fixed at 4 feet 5 $\frac{1}{2}$  inches.

#### WHEEL-CHECK GAUGE.

STANDARD.

Sheet M. C. B. 16.

In 1896 a standard reference gauge for mounting and inspecting wheels was adopted by letter ballot to take the place of the check gauge for mounting wheels, formerly shown on Sheet M. C. B. 12, and the gauge for distance between wheels formerly shown on Sheet M. C. B. 7. At same date a standard check gauge was adopted. See Proceedings 1896. In 1907 these were modified. Modified 1909.

In 1911 the mounting and inspection wheel gauges were eliminated and a wheel check gauge adopted as their substitute.

#### WHEEL FLANGE THICKNESS GAUGES, FOR NEW WHEELS.

STANDARD.

Sheet M. C. B. 16.

Maximum and minimum wheel flange thickness gauges for new wheels were adopted as standard in 1894. Such gauges should be used on all new wheels after September 1, 1894, to insure ability to mount them properly to check gauge.

In 1907 a modified form of wheel flange thickness gauges, applicable to the larger wheel tread then a standard, was adopted as standard. They are shown on Sheet M. C. B. 16. Redesigned in 1909 to suit new tread and flange contour.

In 1911 the minimum flange thickness dimension shown on minimum flange thickness gauge as 1 $\frac{1}{2}$  inches was changed to 1 $\frac{1}{4}$  inches.

In 1912 the maximum and minimum flange thickness gauges were modified so that they can be used for either cast-iron, solid steel or steel-tired wheels; also to limit the maximum and minimum height as well as the throat radius for steel wheels.

#### WHEEL DEFECT GAUGE.

STANDARD.

Sheet M. C. B. 16.

In 1903 the wheel defect gauge shown in the Rules of Interchange was adopted as standard. See Sheet M. C. B. 16. Modified 1904, 1905, 1907, 1909.

## WHEEL CIRCUMFERENCE MEASURE FOR CAST-IRON WHEELS.

STANDARD.

## Sheet M. C. B. 16-A.

By letter ballot in 1893 a Wheel Circumference Measure was adopted as a standard of the Association. Prior to that date it had been recommended for use in all car building shops. See Proceedings 1892, page 172.

In 1900 a new form of Wheel Circumference Measure was adopted as standard, as shown on Sheet 16. See Proceedings 1900, page 114.

In 1910 the brackets used on the wheel circumference measure were replaced with a form to suit the wheel tread and flange contour adopted in 1909. Redesigned in 1911. Redesigned in 1913.

LIMIT GAUGES FOR INSPECTING SECONDHAND WHEELS  
FOR REMOUNTING.

STANDARD.

## Sheet M. C. B. 16-A.

In 1907 limit gauges for use at shops when inspecting secondhand wheels for remounting were adopted as Recommended Practice. Modified in 1909. Advanced to Standard in 1910. In 1911 the method of using gauges was shown on above sheet.

In 1911 the note under limit gauge on Sheet M. C. B. 16a was changed to cover cast-iron wheels with standard tread and flange adopted prior to 1909 and a new gauge added to cover standard tread and flange adopted in 1909.

## CAST-IRON WHEELS.

## Sheets M. C. B.—N, O and P.

In 1904 designs of wheels for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity were adopted as Recommended Practice. Revised 1907. Modified 1909. Modified in 1911. Titles of Sheets M. C. B.—N, O and P changed in 1913 to show gross weight capacity.

SPECIFICATIONS FOR 33-INCH CAST-IRON WHEELS FOR CARS OF MAXIMUM GROSS  
WEIGHTS, NOT TO EXCEED 95,000 POUNDS, 132,000 POUNDS  
AND 161,000 POUNDS.

RECOMMENDED PRACTICE.

## (M. C. B. Sheets — N, O and P.)

Adopted 1893. Revised 1899 and 1904. Modified 1911 in reference to cast date. In 1912 measuring line for nominal diameter was designated as A. B. and the diameters of cores added to drawings. Revised as to form in 1913.

## I. MATERIAL AND CHILL.

1. The wheels shall show clean, gray iron in the plates, except at chaplets, where mottling to not more than  $\frac{1}{2}$  in. from same will be permitted. The depth of pure white iron shall not exceed 1 in. nor be less than  $\frac{1}{2}$  in. in the middle of the tread.

(a) It shall not exceed 1 in. in the middle of the tread nor be less than  $\frac{3}{8}$  in. in throat for wheels having a maximum weight of 625 lbs.

(b) It shall not exceed 1 in. in the middle of the tread nor be less than  $\frac{1}{8}$  in. in the throat for wheels having a maximum weight of 675 lbs.

(c) It shall not exceed 1 in. in the tread nor be less than  $\frac{1}{2}$  in. in the throat for wheels having a maximum weight of 725 lbs.

(d) The depth of white iron shall not vary more than  $\frac{1}{4}$  in. around the tread on the rail line in the same wheel.

## II. PHYSICAL PROPERTIES AND TESTS.

2. **SAMPLING.**—When ready for inspection, the wheels shall be arranged in groups, all wheels of the same date being grouped together, and for each 100 wheels which pass inspection and are ready for shipment, two representative wheels shall be taken at random, one of which will be subjected to the drop test.

3. **DROP TEST.**—The wheels shall conform to the following drop-test requirements:

(a) The test wheel shall be so placed on the three supports, with flange turned downward, that the tup will strike centrally on the hub. When tested in accordance with the following conditions, the wheel shall stand the specific number of blows without fracture:

TABLE I.

Weight of Wheel Pounds.	Weight of Tup Pounds.	Height of Drop Feet.	Number of Blows.
625	200	9	10
675	200	10	12
725	200	12	12

4. **THERMAL TEST.**—Should the test wheel stand the number of blows without breaking into two or more pieces, the inspector will then subject the other wheel to the following test:

(a) **PREPARATION.**—The wheel shall be laid with the flange downward in the sand and a channel way  $1\frac{1}{2}$  in. wide and 4 in. deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of the channel way and the clean flange must form as much of the bottom as its width will cover.

(b) **TEST.**—The above described channel must be filled with molten cast iron, which shall be hot enough, when poured, so that the ring which is formed, when the metal is cold, shall be solid or free from wrinkles or layers. The time when pouring ceases must be noted, and two minutes later an examination shall not show the wheel broken in pieces or any cracks extending into or through the plate.

5. **DROP-TEST MACHINE.**—The three supports shall not be more than 5 in. wide. The anvil shall be supported on rubble masonry at least two feet deep and shall weigh not less than 1,700 lbs. The striking face of the tup shall be 8 in. in diameter and be flat.

### III. RETEST.

6. **NUMBER OF TESTS.**—In making the drop test, should the test wheel break into two or more pieces with less than the required number of blows, then the second wheel shall be taken from the same lot and similarly tested. If the second wheel stands the test it shall be optional with the inspector whether he shall test the third wheel or not. If he does not do so, or if he does and the third wheel stands the test, the 100 wheels will be accepted as filling the requirements of the drop test.

### IV. DIMENSIONS, TAPING AND GAUGING.

7. **DIMENSIONS.**—The normal diameter of the wheel produced by the chill must be the M. C. B. standard 33 in., measured at a point  $2\frac{3}{8}$  in. from the outside of the tread of the wheel. Wheels furnished under this specification shall not vary more than  $\frac{1}{4}$  in. above or below the normal size measured on the circumference and the same wheel shall not vary more than  $\frac{1}{8}$  in. in diameter.

The thickness of the flange shall be regulated by the maximum and minimum flange thickness gauges adopted by the Master Car Builders' Association.

8. **TAPING.**—All wheels shall be taped with M. C. B. standard design of wheel circumference tape, having numbers 1, 2, 3, 4 and 5 stamped  $\frac{1}{8}$  in. apart, the figure 3 to represent the normal diameter 103.67 in. circumference. The figure 1, the smallest, and the figure 5 the largest.

### V. WEIGHTS.

9. All wheels furnished under these specifications shall conform to the respective sections shown by the M. C. B. drawings for different weights of wheels, and weights shall be as follows:

Maximum Gross Weight of Car Pounds.	Maximum Weight of Wheel Not Exceeding Pounds.	Minimum Weight of Wheel Not Less Than Pounds.
95,000	625	615
132,000	675	665
161,000	725	715

(a) **CORES.**—In case of wheels ordered with cores smaller in diameter than the standard, the additional weight should be considered as an addition to the normal weight and paid for by the purchaser.

(b) **NOTE.**—Weights given in the above table are based on M. C. B. Standard drawings covering wheel design, adopted in 1909.

10. **UNDER WEIGHT.**—Wheels that are under minimum weight will be set aside and not further considered.

11. **OVER WEIGHT.**—Wheels that are over the maximum weights will be at the expense of the manufacturer.

#### VI. WORKMANSHIP AND FINISH.

12. **WORKMANSHIP.**—Chills shall have an inside profile that, in the finished wheel, will produce the exact form of the flange and tread contour shown by the M. C. B. drawings adopted in 1909.

13. **FINISH.**—The body of the wheel must be smooth and free from slag, shrinkage or blow holes. The tread shall be free from deep and irregular wrinkles, slag, chill cracks and sweat or beads in the throat, and swelled rims.

#### VII. MARKING.

14. **MARKING.**—All wheels shall be numbered consecutively in accordance with the instructions from the railroad company purchasing them, and shall have the initials of such railroad company, also the wheel number, the weight of the wheel and month, day and year when made, plainly formed on the outside plate of casting. No two wheels shall have the same number. All wheels shall also have the name and place of manufacture plainly formed on the outside plate in casting. Wheels conforming to the requirements and furnished under this specification shall have the letters M. C. B. 1909 plainly formed on the outside plate in casting.

#### VIII. REJECTION LIMITS.

15. If in any lot of wheels submitted for test the test wheel fails to meet the requirements of the drop, chill or thermal test, then all of the wheels in tape number and weight corresponding to the test wheel will be rejected.

(a) **HIGH CHILL.**—In case the rejection is for high chill, weak breaking strength or failure in the thermal test, the test will be continued in the next higher number of tape size.

(b) **LOW CHILL.**—If the rejection is for low chill, the test will be continued in the next lower number tape size.

#### MOUNTING WHEELS.

#### RECOMMENDED PRACTICE

In 1897 the Recommended Practice for mounting wheels was modified by letter ballot by the omission of that part providing, among other things, that wheels with flanges worn to a thickness of  $1\frac{1}{8}$  inches or less should not be remounted, and the substitution therefor of the following:

*First.*—That wheels with flanges worn to a thickness of 1-16 inches or less shall not be remounted.

*Second.*— That the thickness of flanges of wheels fitted on the same axle should be equal and should never vary more than 1-16 inch.

*Third.*— That in mounting wheels, new or secondhand, the standard wheel mounting and check gauge be used in the following manner:

After one wheel is pressed into position, place the stop "A" or "B" of the check gauge against the inside of the flange of the wheel with the thinner flange with the corresponding tread stop "C" or "D" against the tread of the wheel. Press the other wheel on the axle until the opposite tread stop comes in contact with the tread with the corresponding gauge point "E" or "F" in contact with the outside of the thicker flange.

#### MINIMUM THICKNESS FOR STEEL TIRES.

#### RECOMMENDED PRACTICE.

##### Sheet M. C. B.—C.

In 1894 a Recommended Practice was adopted for Minimum Thickness for Steel Tires of Car Wheels, to be 1 inch, to be measured normal to the tread and radial to the curved portions of the flange through the thinnest part within  $4\frac{1}{4}$  inches from the back of the flange; the thickness from the latter point to the outer edge of tread to be not less than  $\frac{1}{2}$  inch at thinnest part as shown on Sheet M. C. B.—C.

A further practice was adopted of cutting a small groove, as shown in the outer face of all tires when wheels are new, at a radius  $\frac{1}{4}$  inch less than that of the tread of tire when worn to the prescribed limit, to facilitate inspection.

#### WHEEL TREAD AND FLANGE FOR STEEL AND STEEL-TIRED WHEELS.

#### RECOMMENDED PRACTICE.

##### Sheet M. C. B.—C.

In 1909 the former illustration then shown on Sheet M. C. B.—A. was discarded, and the four illustrations shown on Sheet M. C. B.—C. substituted, to govern service operations for both steel and steel-tired wheels under both passenger and freight cars.

Also, that the location of limit of wear of groove be  $\frac{1}{4}$  inch below the tread face on steel and steel-tired wheels where same have worn to condemning limit, as shown in illustrations on Sheet M. C. B.—C; the shape of the groove to be as shown on these illustrations and the measurements to be taken from the horizontal or inside edge of same.

In 1909 the tread and flange contour for steel and steel-tired wheels was revised as shown on Sheet M. C. B.—C. It is exactly similar to the new tread and flange contour for cast-iron wheels from the point of the flange to the outside of the tread only, and the development of the flange from the point to the back face of the wheel or tire has been made of such form that the same mounting and inspecting gauge used for cast-iron wheels can be used for the new section of steel and steel-tired wheels.

In 1912 the thickness of flange for steel and steel-tired wheels was increased  $\frac{3}{32}$  inch, making the contour to the base line the same as for cast-iron wheels.

#### DIAMETER OF STEEL AND STEEL-TIRED WHEELS.

#### RECOMMENDED PRACTICE.

In 1911 a recommended practice of 33 inches was adopted as the diameter for all new steel and steel-tired wheels for freight cars.

In 1911 a recommended practice was also adopted that for high-capacity cars built in the future and likely to be equipped with steel wheels that provisions be made in the construction of car and trucks to permit the use of wheels varying in diameter from 33 inches to 30 inches.

In 1912 specifications covering dimensions and tolerances for solid wrought-steel wheels for freight and passenger car service were adopted as recommended practice. Revised 1913 and Sheets M. C. B.—R, S and T changed to conform.

#### SPECIFICATION GOVERNING DIMENSIONS AND TOLERANCES

#### FOR SOLID WROUGHT-STEEL WHEELS FOR FREIGHT

#### AND PASSENGER CAR SERVICE.

#### RECOMMENDED PRACTICE.

##### I. MANUFACTURE.

1a. PROCESS.—The steel shall be made by the open-hearth process.

1b. DISCARD.—A sufficient discard shall be made from the top of each ingot from which the blanks are made, to insure freedom from injurious piping and undue segregation.

##### II. CHEMICAL PROPERTIES AND TESTS.

2a. CHEMICAL COMPOSITION.—The steel shall conform to the following requirements as to chemical composition:

	ACID.		BASIC.	
Carbon .....	0.60	—0.80	0.65	—0.85 per cent
Manganese .....	0.55	—0.80	0.55	—0.80 per cent
Silicon .....	0.15	—0.35	0.10	—0.30 per cent
Phosphorus .....	not over	0.05	not over	0.05 per cent
Sulphur .....	not over	0.05	not over	0.05 per cent

2b. LADLE ANALYSES.—To determine whether the material conforms to the requirements specified in Section II, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

2c. CHECK ANALYSES.—A check analysis may be made by the purchaser from any one or more wheels representing each melt, and this analysis shall conform to the requirements specified in Section II. A sample may be taken from any one point in the plate; or two samples may be taken, in which case they shall be on radii at right angles to each other.

Samples shall not be taken in such a way as to impair the usefulness of the wheel. Drillings for analysis shall be taken by boring entirely through the sample parallel to the axis of the wheel; they shall be clean from scale, oil and other foreign substances. All drillings from any one wheel shall be thoroughly mixed together.

### III. TOLERANCES.

3. Wheels should be furnished rough-bored and with faced hubs, and have a contour of tread and flange as rolled or machined according to recommended practice Sheet M. C. B.—C. They should conform to dimensions specified within the following tolerances:

3a. HEIGHT OF FLANGE.—The height of flanges should not be more than  $\frac{1}{8}$  inch over and must not be under that specified or 1 inch.

3b. THICKNESS OF FLANGE.—Thickness of flange shall not vary more than  $\frac{1}{16}$  inch over or under that specified.

3c. THROAT RADIUS.—The radius of the throat shall not vary more than  $\frac{1}{16}$  inch over or under that specified.

3d. THICKNESS OF RIM.—The thickness of rim to be measured between the limit of wear groove and the top of the tread at the point where it joins the fillet at throat of flange. The average thickness of service metal of all wheels in any shipment must not be less than  $1\frac{3}{4}$  inches, measured from the limit of wear groove to top tread. The thickness of rim should in no case be less than  $\frac{3}{8}$  inch under that specified.

3e. WIDTH OF RIM.—The width of rim shall not be more than  $\frac{1}{8}$  inch less nor more than  $\frac{1}{8}$  inch over that specified.

3f. THICKNESS OF PLATE.—The thickness of the plate of the wheel shall not be less than  $\frac{3}{4}$  inch at the point where the plate joins the fillet at the rim and not less than 1 inch at the point where the plate joins the fillet at the hub. Intermediate minimum thickness to be proportional.

3g. LIMIT OF WEAR GROOVE.—The limit of wear groove to be located as shown in Sheet M. C. B.—C.

3h. DIAMETER OF BORE.—The diameter of rough bore shall not vary more than  $\frac{1}{16}$  inch above or below that specified. When not specified, the rough bore shall be  $\frac{1}{4}$  inch less in diameter than the finished bore, subject to the above limitations.

3i. HUB DIAMETER.—The hub diameter may be either 10 inches or 11 inches in diameter, as specified, with a maximum variation of  $\frac{1}{8}$  inch below. The thickness of the wall of the finished bored hub shall not vary more than  $\frac{3}{8}$  inch at any two points on the same wheel.

3j. HUB LENGTH.—The length of hub shall not vary more than  $\frac{1}{8}$  inch over or under that specified.

3k. DEPRESSION OF HUB.—The depression of the hub must be made so that the distance from the outside face of the hub to the line "AB" shall not exceed  $1\frac{1}{8}$  inches for wheels used on  $5\frac{1}{2}$ -inch axles and under, and  $1\frac{3}{8}$  inches for wheels used on 6 by 11 inch axles.

3l. **BLACK SPOTS IN HUB.**—Black spots will be allowed within two inches of the face of the hub, but must not be of such depth that they will not bore out and give clear metal at finished size of bore.

3m. **ECCENTRICITY OF BORE.**—The eccentricity between the tread at its center line and the rough bore shall not exceed  $\frac{3}{64}$  inch.

3n. **BLOCK MARKS ON TREAD.**—The maximum height of block marks must not be greater than  $\frac{1}{64}$  inch.

3o. **ROTUNDITY.**—All wheels shall be gauged with a ring gauge, and the opening between the gauge and tread at any one point shall not exceed  $\frac{1}{8}$  inch.

3p. **PLANE.**—Wheel shall be gauged with a ring gauge placed concentric and perpendicular to the axis of the wheel. All points on the back of the rim equidistant from the center shall be within a variation of  $\frac{1}{8}$  inch from the plane of the same gauge when so placed.

3q. **TAPE SIZES.**—Wheels shall not vary more than five tapes under nor nine tapes over the size called for.

3r. **MATING.**—The tape sizes shall be marked in plain figures on each wheel. Wheels must be mated to tape sizes and shipped in pairs.

3s. **GAUGE.**—Gauges and tape used shall be M. C. B. Standard or Recommended Practice as follows:

Wheel circumference measure, M. C. B. Sheet C.

Maximum flange thickness gauge, M. C. B. Sheet 16.

Minimum flange thickness gauge, M. C. B. Sheet 16.

Rotundity gauge, M. C. B. Sheet C.

Plane gauge, M. C. B. Sheet C.

Gauge for measuring service metal, M. C. B. Sheet C-1.

#### IV. BRANDING.

The name or brand of the manufacturer, date and serial number shall be legibly stamped on each wheel in such a way that the wheel may be readily identified. The tape size shall be legibly marked on each wheel, Sheet M. C. B. C-2.

#### V. FINISH.

5. The wheel shall be free from injurious defects, and shall have a workmanlike finish.

5a. Wheels shall not be offered for inspection if covered with paint, rust, or any other substance, to such an extent as to hide defects.

#### VI. INSPECTION.

6. Inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturers' work which concern the manufacturer of the material ordered.

6a. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary gauges to satisfy him that the wheels

are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment, and free of cost to the purchaser.

6b. The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere as may be decided by the purchaser. Such tests, however, shall be made at the expense of the purchaser.

6c. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

6d. Wheels which show injurious defects while being finished by the purchaser shall be rejected, and manufacturer promptly notified.

6e. Samples of rejected material must be preserved at the laboratory of the purchaser for one month from date of test report. In case of dissatisfaction with the results of the test, manufacturer may make claim for a rehearing in that time.

#### **SIZES AND DIMENSIONS FOR SOLID STEEL WHEELS.**

#### **RECOMMENDED PRACTICE.**

##### **Sheets R, S and T.**

In 1912 sizes and dimensions for solid steel wheels for freight and passenger cars were adopted as recommended practice. See Sheets R, S and T. Revised 1913.

#### **ROTUNDITY GAUGE FOR SOLID STEEL WHEELS.**

#### **RECOMMENDED PRACTICE.**

##### **Sheet M. C. B.—C.**

In 1912 a rotundity gauge was adopted for the purpose of measuring the maximum distance that wheels are out of round.

#### **PLANE GAUGE FOR SOLID STEEL WHEELS.**

#### **RECOMMENDED PRACTICE.**

##### **Sheet M. C. B.—C.**

In 1912 a plane gauge was adopted for the purpose of measuring how much wheels are out of plane.

#### **WHEEL-CIRCUMFERENCE MEASURE FOR STEEL AND STEEL-TIRED WHEELS.**

#### **RECOMMENDED PRACTICE.**

##### **Sheet M. C. B.—C.**

In 1913 a wheel-circumference measure was adopted for measuring the circumference of steel or steel-tired wheels.

#### **GAUGE FOR MEASURING THICKNESS OF RIM OF STEEL WHEELS.**

#### **RECOMMENDED PRACTICE.**

##### **Sheet M. C. B.—C<sup>1</sup>.**

In 1912 a gauge was adopted for the purpose of measuring the thickness of the rim above the limit of wear groove. With this gauge it is

possible to measure direct the amount of metal necessary to restore the tread to M. C. B. contour; also to measure direct the amount of service metal remaining above the condemning limit after the tread is restored to M. C. B. contour.

**TIRE FASTENING FOR STEEL-TIRED WHEELS.**

**RECOMMENDED PRACTICE.**

Sheet M. C. B.—C.

In 1912 the form of fastening for steel-tired wheels shown on above sheet was adopted.

**BRANDING STEEL WHEELS.**

**RECOMMENDED PRACTICE.**

Sheet M. C. B.—C<sup>2</sup>.

In 1912 a method of branding of solid steel wheels was adopted.

**BRAKE HEAD AND SHOE.**

**STANDARD.**

Sheet M. C. B. 17.

The brake head and shoe shown on this sheet, known as the Christie brake head and shoe, were adopted as a standard of the Association, by letter ballot, in 1886, with the exception of some slight modification in details made since that date. Drawing revised in 1896, 1898 and 1907.

The revision made in 1896 consisted in the modification of the designs of brake head and shoe so as to secure increased clearance at the ends of shoe and equal clearance both above and below the central lug on the back of the shoe; also, the addition of brackets to support the lower bridge lug of brake head similar to the brackets formerly used to support the upper bridge lug. The taper of the shoe was altered so that it would correspond with the taper of the standard wheel tread, by increasing the thickness of the inner edge of the shoe from 1 3-16 inches to 1 5-16 inches.

The revision made in 1898 consisted in reducing the clearance allowed on either side (above and below) the central lug of brake shoe and adjacent lugs of brake head from 1/8 inch to 1-16 inch—the change being made wholly in the head and no change in the shoe.

In 1907 the drawing was further revised to show only the standard dimensions of the brake head, and also in the combined drawing of the brake head and shoe.

The drawing showing the shoe was also revised in part, as well as the drawing showing the relation of ends of head and shoe. See Sheet M. C. B. 17.

In 1908, the projection, top and bottom, at back of brake shoe, which forms spacer between lugs of brake head, was increased to 9-16 inch in depth.

In 1909 the center lug, and recess for same, in brake head was changed so that the width of lug comes flush with side face of shoe to provide

better bearing for center lug of brake shoe and also to prevent twisting of head.

In 1910 a standard was adopted that all inserts in brake shoes must extend in new shoes to a depth equal to at least one-half of the total shoe depth.

In 1912 Sheet 17, illustrating the brake head and shoe, was redrawn.

#### SPECIFICATIONS FOR BRAKE SHOES.

#### STANDARD.

In 1901 specifications for brake shoes were adopted as Standard as a result of letter ballot. In 1910 they were replaced by the following:

#### TESTS.

1. KINDS OF TEST.—Shoes shall be tested for coefficient of friction and for wear upon the Master Car Builders' Association testing machine, or upon a machine with equivalent characteristics.

#### A. COEFFICIENT OF FRICTION TEST:

2. CAST-IRON WHEEL.—Shoes shall develop upon the cast-iron wheel, in effecting stops from an initial speed of 40 miles per hour, a mean coefficient of friction of not less than:

- (a) 22 per cent when the brake-shoe pressure is 2,808 lbs.
- (b) 16 per cent when the brake-shoe pressure is 6,840 lbs.

3. STEEL-TIRED WHEEL.—Shoes shall develop upon the steel or steel-tired wheel, in effecting stops from an initial speed of 65 miles per hour, a mean coefficient of friction of not less than:

- (a) 12½ per cent when the brake-shoe pressure is 6,840 lbs.
- (b) 11 per cent when the brake-shoe pressure is 12,000 lbs.
- (c) No limitation is placed upon the rise in coefficient of friction at the end of the stop.

#### B. SHOE-WEAR TEST:

4. CAST-IRON WHEEL.—Shoe wear shall be determined upon the cast-iron wheel by making not less than 100 applications of the shoe to the wheel, under pressure of 2,808 lbs., and at a constant peripheral speed of the wheel of 20 miles per hour. At each application, the shoe shall remain in contact with the wheel during 190 revolutions of the latter and between applications the shoe shall remain out of contact during 610 revolutions of the wheel. Under these conditions, the shoe shall lose in weight not more than 0.8 of a pound for each 100,000,000 foot-pounds of work done.

5. STEEL-TIRED WHEEL.—Shoe wear shall be determined upon the steel or steel-tired wheel by making not less than ten stops from initial speed of 65 miles per hour and under a pressure of 12,000 pounds. Ten minutes shall intervene between successive applications of the shoe. Under these conditions the shoes shall lose in weight not more than 4.0 lbs. from each 100,000,000 foot-pounds of work.

NOTE.—When a shoe, not entirely metallic in its composition, is

tested for wear, its actual loss in weight shall be increased in the ratio which the density of the cast iron bears to the mean density of the abraded parts of the shoe, in order to determine the weight which is to be compared with the specifications.

#### GAUGING AND DRAWING.

6. GAUGING.—That the back of the shoe be made to conform to the gauge shown, Sheet M. C. B. 17.

7. DRAWINGS.—In 1912 the drawing of the brake head was changed to show the hanger hole straight with a radius of  $\frac{3}{8}$  in. at each end to accommodate the straight hanger with filleted corners.

#### BRAKE HEAD GAUGE.

STANDARD.

Sheet M. C. B. 17.

In 1907 a brake head gauge was adopted as standard.

For action of the Association, see Proceedings 1886; Proceedings 1888; Proceedings 1891; Proceedings 1908.

In 1912 a brake-head gauge was adopted for gauging the top and bottom slot in the head.

#### BRAKE SHOE GAUGE.

STANDARD.

Sheet M. C. B. 17.

In 1910 a brake shoe gauge, shown on Sheet M. C. B.—17, was adopted as standard.

#### LEVER PIN HOLE GAUGE.

STANDARD.

Sheet M. C. B. 17-A.

In 1907 the lever pin hole gauge shown on Sheet M. C. B. 17-A was adopted as standard.

#### BRAKE BEAMS.

STANDARD.

Sheet M. C. B. 17-A.

Certain dimensions and capacities of brake beams were adopted as standard of the Association, by letter ballot, in 1889, and these standards, as modified by subsequent action, are shown on this drawing for iron brake beams.

Standard heights of brake beams, when measured from the tops of the rails to the center of the face of new shoes, were adopted in 1894, as follows:

For inside hung beams, 13 inches.

For outside hung beams,  $14\frac{1}{2}$  inches.

In 1907 the following details for brake beams and gauges were adopted as standard:

All brake beams shall be  $60\frac{1}{4}$  inches in length from center to center of brake head, with an allowable variation of  $\frac{1}{4}$  inch in either direction.

All brake beams shall be proven by gauge shown on Sheet M. C. B. 17, which shall be the standard gauge for that purpose.

Attachments for safety hangers shall be 51 inches from center to center.

The angle of the lever fulcrum shall be 40 degrees from the vertical.

The lever pin hole shall be either 2 inches or 3 inches in front of the top of the brake head lugs. The variations in either directions from above measurements shall not exceed 1-16 inch. Holes should be made straight and true by drilling, reaming or broaching, and shall be not less than 1 3-32 inches nor more than  $1\frac{1}{4}$  inches in diameter.

All lever pin holes shall be proven by gauge shown on Sheet M. C. B. 17-A, which shall be the standard gauge for that purpose.

In 1908 the following detail regarding brake beams was advanced from Recommended Practice to Standard:

Brake beam hangers shall be  $\frac{7}{8}$  inch in diameter.

In 1908 two brake beams were adopted as standard, as follows:

Brake beam No. 1 to be suitable for cars weighing not over 35,000 pounds light weight.

Brake beam No. 2 to be suitable for cars exceeding 35,000 pounds light weight.

In 1909 the following was adopted to establish a uniform practice for designating right and left hand brake beams:

When facing back of brake beam with center strut pointing away from observer where the top of lever slot inclines toward the right it shall be known as right-hand beam, and where top of lever inclines toward the left it shall be known as left-hand beam.

On cars built after September 1, 1909, it will not be permissible to hang brake beams from any portion of the body of the car.

In 1910 the drawing of the brake head was modified as regards the size and shape of the hanger hole.

In 1910 the following Recommended Practice was advanced to Standard:

The brake beam hanger bracket shall be attached to some rigid portion of the truck.

In 1911 the use of brake beam No. 2 was extended as follows: Beam No. 2 must be used on cars of more than 35,000 pounds light weight, and it may be used on cars of 35,000 pounds light weight or less.

In 1913 a spacing of 60 inches from center to center of brake heads, with an allowable variation of  $\frac{1}{4}$  inch in either direction, was adopted.

**BRAKE BEAM GAUGE.****STANDARD.**

Sheet M. C. B. 17-A.

In 1907 a brake beam gauge as shown on Sheet M. C. B. 17-A was adopted as standard.

In 1912 this gauge was redesigned and adopted as recommended practice. It determines the following dimensions and adjustments: (1) Limiting outline of brake beam; (2) length of beam; (3) proper alignment of the heads in relation to each other; (4) proper location of pin hole and center of strut; (5) angle of lever fulcrum.

In 1913 the limiting outline gauge for brake beams was altered to suit the change in beam from 60 $\frac{1}{4}$  inches to 60 inches, center to center of head, and a new brake beam gauge with details adopted as Standard.

**BRAKE BEAM GAUGE LIMITING OUTLINES.****STANDARD.**

Sheet M. C. B. 17-A.

In 1911 a limiting outline gauge shown for No. 2 brake beams used on cars built after January 1, 1908, was adopted as standard.

**BRAKE BEAM SPECIFICATIONS AND TESTS.****STANDARD.****TESTS.****A. BEAM No. 1.**

1. **INITIAL LOAD.**—Apply an initial load of 4,000 pounds, then reduce it to zero.

2. **TEST LOAD.**—Apply a test load of 6,500 pounds, and under this load measure the deflection which is desired to be  $\frac{1}{16}$  in. or 0.0625 in., but shall not exceed 0.07 in.

3. **LOAD TO FAILURE.**—If desired the beam may then be loaded until failure occurs. Under this test the maximum load borne by the beam shall not be less than 20,000 lbs.

**B. BEAM No. 2.**

4. **INITIAL LOAD.**—Apply an initial load of 6,000 lbs., then reduce to zero.

5. **TEST LOAD.**—Apply a test load of 12,000 lbs., and under this load measure the deflection, which is desired to be  $\frac{1}{16}$  in. or 0.0625 in., but shall not exceed 0.07 in.

6. **LOAD TO FAILURE.**—If desired the beam may then be loaded until failure occurs. Under this test the maximum load borne by the beam shall not be less than 38,000 lbs.

7. **SAMPLING.**—For each 500 brake beams or less which pass inspection and are ready for shipment, one representative beam shall be taken at random and subjected by the company manufacturing the beams, in the presence of the railroad company's inspector, to the above test in a suitable machine.

8. **NUMBER OF TESTS.**—In case a brake beam shall fail in test described herein, then a second beam shall be taken from the same lot and similarly tested. If the second beam stands the test, it shall be optional with the inspector whether he shall test a third beam or not. If he does not do so or if he does do so and the third beam stands the test, the 500 beams or less shall be accepted as filling the requirements of this test.

9. **PREPARATION.**—The beams shall be equipped with suitable heads and shoes, and the shoes placed in contact with castings representing the tread of the wheel. When mounted in this manner, the load shall be applied to the fulcrum in the normal line of pull.

#### REJECTION.

10. A lot of 500 brake beams or less submitted for test that fail to meet the prescribed test will not be accepted.

11. Individual beams which do not conform to the standard dimensions and those that have physical defects will not be accepted.

#### BRAKE BEAMS.

#### RECOMMENDED PRACTICE.

In 1907 the following details regarding brake beams were adopted as recommended practice:

That brake hangers shall have an angle as nearly as possible to 90 degrees from a line drawn from the center of the brake shoe to the center of the axle when the shoes are half worn.

In 1910 a Recommended Practice was adopted that all beams be inside hung beams.

In 1912 the practice was adopted that, in order to designate an M. C. B. brake beam, the letters "M. C. B." and the numerals "No. 1" or "No. 2," as the case may be, be cast, forged or stamped on the fulcrum, and that after January 1, 1913, this be cast on the fulcrum if the fulcrum be a casting, or forged on the fulcrum if the fulcrum be a forging.

#### AIR BRAKES — GENERAL ARRANGEMENT AND DETAILS.

#### STANDARD.

##### Sheet M. C. B. 18.

The general arrangement and details of brake gear for air-brake cars, as shown on this sheet, are standard. See letter ballot 1889, and other action 1890, 1891 and 1898. At the same time the following standards were adopted in this connection:

1. Maximum train-pipe pressure, 70 pounds per square inch.
2. Maximum brake power in freight cars, 70 per cent of the light weight of car.
3. All levers 1 inch in thickness; all pins to be 1 3-32 inches in diameter; all jaws or clevises made of ¾-inch by 2½-inch iron; all rods ¾ inch diameter.

4. Angle of brake beam lever, 40 degrees with vertical.  
Drawing revised in 1896 and 1898.

The revision made in 1896 consisted in the omission of such detail dimensions as could not be used in all cases, such as the length and proportions of main levers, and the omission of some of the smaller parts from the drawing, such as the pipe clamps, staples, etc. The dimensions of the cross-section of the malleable iron truck lever connection were increased, and the letters W. I., M. I., C. I., etc., indicating the material of which the parts were to be made, were omitted from the drawing.

In 1898 the following changes were made:

Diameter of truck lever connection for outside hung brakes changed from  $\frac{3}{4}$  inch to  $\frac{7}{8}$  inch, and a note to this effect was added under title on this sheet.

Diameter of hole for cotter in air-brake pin was first indicated as 7-16 inch.

Addition was made to note under drawing of truck lever connection for inside hung brakes as follows: "If made of round iron or steel, must not be less than  $1\frac{5}{8}$  inches diameter."

Dummy coupling was omitted from drawing and air hose was shown as hanging down.

The words "33 inches or" were omitted from height shown for air-brake pipe above rail.

Diameter of release-valve rod was changed from  $\frac{1}{4}$  inch to  $\frac{3}{8}$  inch.

In 1900 a standard brake pipe nipple, 10 inches long, was ordered shown located directly back of the angle cock.

See Sheet M. C. B.—Q for recommended practice for location of air-brake parts.

In 1904 the location of the main air pipe and angle cock was changed from Recommended Practice to Standard. See letter ballot, Proceedings 1904.

In 1911 the following specifications were adopted:

Brake chain shall be of not less than  $\frac{3}{8}$ -inch, preferably  $\frac{7}{16}$ -inch, wrought iron or steel, with a link on the brake-rod end of not less than  $\frac{7}{16}$ -inch, preferably  $\frac{1}{2}$ -inch, wrought iron or steel, and shall be secured to brake-shaft drum by not less than  $\frac{1}{2}$ -inch hexagon or square head bolt. Nut on said bolt shall be secured by riveting end of bolt over nut.

In 1908 the diameter of the holes in the different levers, guides, brackets and connections were omitted, and a note added to drawing reading as follows: "All holes for brake pins not less than 1 3-32 inches diameter nor more than  $1\frac{1}{8}$  inches diameter."

In 1909, in order to suit the different types of air-brake equipment and particularly to provide for the 10-inch brake cylinder, a note was added to Sheet M. C. B. 18:

For brake cylinders larger than 8 inches or for brake-cylinder pressures above 50 pounds per square inch, the size of brake rods and levers

should be increased, if necessary, so that the fiber stress shall not exceed 15,000 pounds per square inch for rods and 23,000 pounds per square inch for levers. See Sheet M. C. B. 18.

In 1909 the use of malleable-iron construction was discontinued, and providing that the truck connections be made of round iron or steel not less than  $1\frac{5}{8}$  inches diameter.

In 1911 the use of cast steel for truck-lever connections was permitted.

In 1911 a standard bottom rod for use with all steel or steel-tired wheels with inside hung brakes was adopted as shown on Sheet M. C. B. 18.

In 1912 Sheet M. C. B. 18 was revised to show an additional lever, in order that the hand brake and air brake will work in harmony on double hand-brake cars.

#### AIR BRAKES.—GENERAL ARRANGEMENT AND DETAILS.

#### RECOMMENDED PRACTICE.

In 1913 the braking power for freight equipment at 60 per cent of the light weight of the car, based on 50 pounds per square inch cylinder pressure, was adopted as Recommended Practice.

#### SPECIFICATIONS FOR AIR-BRAKE HOSE.

#### STANDARD.

In 1901 specifications and tests for air-brake hose were adopted as Recommended Practice. Advanced to Standard in 1903. Revised 1905. Revised 1913.

In 1911 detailed specifications of label were placed under the heading "Label for Air Brake Hose."

#### SPECIFICATION FOR AIR-BRAKE AND SIGNAL HOSE.

#### STANDARD.

##### I. MANUFACTURE.

1. All air-brake hose shall be soft and pliable, and not less than four-ply. They shall be made of rubber and cotton fabric, each of the best of its kind for the purpose. No rubber substitutes or short-fiber cotton to be used.

##### II. PHYSICAL PROPERTIES AND TESTS.

Hose will be subjected to the following tests:

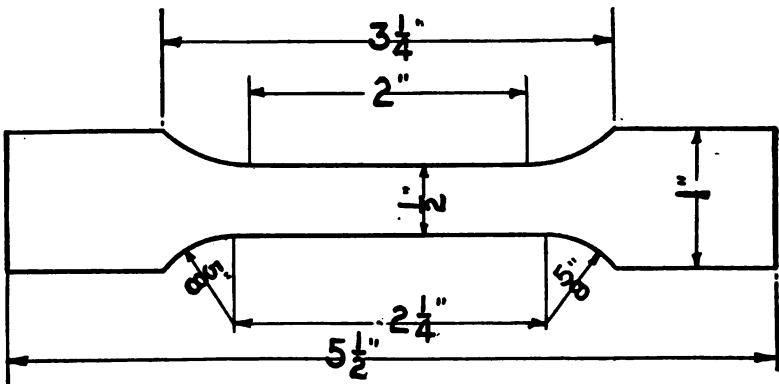
2. **POROSITY TEST.**—A hose will be selected at random and filled with air at 140 pounds pressure for five minutes. At the end of this time the rubber cover will be split with a knife and the hose submerged in water. This test is to determine the porosity of the inner tube. The escape of air must be distinct enough so that the porosity will not be confused with the escape of air which is confined within structure of the hose. This test determines whether or not the lot of two hundred is accepted or rejected.

3. **BURSTING TEST.**—The hose selected for test will have a section 5 inches long cut from one end, and the remaining 17 inches will then be subjected to a hydraulic pressure of 200 pounds per square inch, under which pressure it shall not expand more than  $\frac{3}{4}$  inch in circumference nor develop any small leaks or defects. This section must then stand a hydraulic pressure of 500 pounds per square inch for ten minutes without bursting.

4. **FRICTION TEST.**—A section 1 inch long will be taken from the 5-inch section previously cut off and the quality determined by suspending a 20-pound weight to the separated end, the force being applied radially and the amount of unwinding shall not exceed 8 inches in ten minutes.

5. **STRETCHING TEST.**—Another section 1 inch long will be cut from the remainder of the 5-inch piece, and the rubber tube or lining will be separated from the ply and cut at the lap. Marks 2 inches apart will be placed on the section, and then the section will be quickly stretched until the marks are 10 inches apart and immediately released. The section will then be re-marked as at first and stretched to 10 inches and will remain so stretched 10 minutes. It will then be completely released, and within thirty seconds of the time of releasing the distance between the marks last applied will be measured, and the initial set must not be more than  $\frac{1}{4}$  inch. At the end of ten minutes, distance between the marks will be again measured, and final set must be not more than  $\frac{1}{8}$  inch. The small strips taken from the cover will be subjected to the same test.

6. **TENSILE STRENGTH.**—With a specially designed die of the following dimensions:



## TENSILE SPECIMEN.

Test pieces will be cut from the tube and cover and pulled in a tensile machine with a test speed of 20 inches per minute. After an elongation of

at least 10 inches, the inner tube must have a tensile strength of between 800 and 1,200 pounds per square inch, and the cover 700 to 1,100 pounds per square inch.

7.—SAMPLING.—For each lot of two hundred, one extra hose shall be furnished free of cost.

### III. SIZE AND DIMENSIONS.

8.	Air-brake Hose, Inches.	Air-signal Hose, Inches.
Length —		
Maximum .....	22½	22½
Minimum .....	22	22
Outside diameter —		
Maximum .....	2½	1¾
Minimum .....	2⅞	1⅞
Inside diameter —		
Maximum .....	1⅞	1⅞
Minimum .....	1¾	1½
Thickness of cap vulcanized on —		
Maximum .....	¾	¾
Minimum .....	¾	¾

9. Hose shall be smooth and regular in size throughout its entire length.

### IV. WORKMANSHIP.

10. TUBE.—The tube shall be made either by hand or machine. It shall be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it can not be separated without breaking or splitting the tube. The tube shall be of such composition and so cured as to successfully meet the requirements of the tests given in Sections 5 and 6, the tubes to be not less than ¾ inch thick at any point.

11. WRAPPING.—The canvas, or woven fabric used as a wrapping for the hose, shall be made of long fiber cotton, loosely woven, from 38 to 40 inches in width, and to weigh not less than 20 to 22 ounces per yard, respectively, this to be determined by the following test:

The tensile strength of the warp or filler strands shall be such that the breaking strength of a single strand multiplied by the number of warp or filler strands per inch shall not be less than 220 pounds.

The wrapping shall be frictioned on both sides, and shall have, in addition, a distinct coating or layer of gum between each ply. The canvas wrapping shall be applied on the bias and the edges lapped at least ½

inch. Woven or braided covering should be loose in texture, so that the rubber on either side will be firmly united.

12. COVER.—The cover shall be of the same quality of gum as the tube and shall not be less than  $\frac{1}{8}$  inch thick.

#### V. MARKING.

13. SERIAL NUMBER.—Each lot of two hundred or less must bear the manufacturer's serial number, commencing at "1" on the first of the year and continuing consecutively until the end of the year.

14. LABEL.—Each length of hose shall have vulcanized on it the label for air-brake hose of red or white rubber as shown under the specifications for "Label for Air-brake Hose."

#### VI. INSPECTION.

15. REJECTION.—If the test hose fails to meet the required test, the lot from which it was taken may be rejected without further examination and returned to the manufacturer.

16. INSPECTION.—Inspection shall be made at destination. If the test hose is satisfactory, the entire lot will be examined and those complying with the specifications will be accepted.

17. FREIGHT CHARGES.—Rejected material will be returned to the manufacturer, who shall pay freight charges both ways.

#### **SPECIFICATIONS AND TESTS FOR WOVEN AND COMBINATION WOVEN AND WRAPPED AIR-BRAKE HOSE.**

In 1907 the following specifications were adopted for Woven and Combination Woven and Wrapped Air-Brake Hose, as Recommended Practice. In 1908 they were advanced to Standard. In 1911 detailed specifications for label were placed under the heading "Label for Air Brake Hose."

All air-brake hose under this specification is to consist of not less than three plies of woven, braided or knitted fabric, or of two or more plies of canvas wrapping surrounded by at least one ply of woven, knitted or braided fabric. The hose should be flexible without kinking easily. The rubber, fabric or duck should be the best of its kind made for the purpose, and no rubber substitute or short fiber fabric will be allowed.

The inner tubes should be composed of three calendars of rubber and not less than 3-32 inch thick at any point. Should a machine-made tube be used, it must not be less than  $\frac{1}{8}$  inch thick at any point. It must be free from holes and imperfections, and in joining it must be so firmly united to the cotton fabric that it can not be separated without breaking or splitting the tube. Each ply of the hose should be separated by a distinct layer of rubber, and over this is to be a cover 1-16 inch thick, and at each end a 1-16 inch cap should be vulcanized on, the cover and the cap to be of the same material as the inner tube.

The hose is to be furnished in 22-inch lengths, and variations exceeding  $\frac{1}{4}$  inch from this length will not be permitted. The rubber caps at each end are not to be less than 1-16 inch nor more than  $\frac{1}{8}$  inch thick. The inside diameter of the hose must not be less than  $1\frac{3}{8}$  inches nor more than 1 7-16 inches, nor must the outside diameter be less than 2 1-32 inches nor greater than 2 3-32 inches. The hose must be smooth and regular in size throughout its entire length.

Each length of hose must have vulcanized on it the label for air-brake hose of white or red rubber, as shown under the specifications entitled "Label for Air Brake Hose."

Each lot of 200 or less must bear the manufacturer's serial number, commencing at "1" on the first of the year and continuing consecutively until the end of the year, and the serial number should not be duplicated, even though the hose bearing the original numbers be rejected. For each lot of 200, one extra hose must be furnished free of cost.

#### TESTS TO WHICH SAMPLES WILL BE SUBJECTED.

**BURSTING TEST.**—All hose selected for test will have a section 5 inches long cut from one end and the remaining 17 inches will then be subjected to a hydraulic bursting pressure of 400 pounds per square inch for ten minutes, which it must stand without failure. At a pressure of 100 pounds per square inch it must not expand more than  $\frac{1}{4}$  inch in diameter or change in length more than  $\frac{1}{4}$  inch, nor develop any small leaks or defects.

**FRICTION TEST.**—A section 1 inch long will be taken from the 5-inch piece previously cut off, and the quality determined by suspending a 20-pound weight to the separated end, the force being applied radially, and the time of unwinding must not exceed 8 inches in ten minutes.

**STRETCHING TEST.**—Another section 1 inch long will be cut from the balance of the 5-inch piece and the inner tube or lining will be separated from the ply and cut at the lap. Marks two inches apart will be placed on this section, and then the section will be quickly stretched until the marks are 8 inches apart and immediately released. The section will then be remarked as at first and stretched to 8 inches and will remain so stretched ten minutes. It will then be released and ten minutes later the distance between the marks last applied will be measured. In no case must the test piece break or show a permanent elongation of more than  $\frac{1}{4}$  inch between the marks last applied. One-inch strips will also be taken from the cover and will be subjected to the same test.

**TENSILE TEST.**—Another section 1 inch long will be cut from the remainder of the 5-inch piece and the rubber tube or lining will be separated from the ply and cut at the lap. It will then be reduced in the middle for a distance of 2 inches by  $\frac{1}{2}$  inch wide parallel. The parallel section shall be spread to the full width of 1 inch at the end by curves of  $\frac{1}{2}$  inch radius. This specimen shall be stretched uniformly by gripping the enlarged ends, and in no case should the tensile strength per square

inch be less than 400 pounds, nor the elongation at the time of failure less than 8 inches, measured by marks placed originally 2 inches apart before breaking.

If the test hose fails to meet the required tests the lot from which it was taken may be rejected without further examination and returned to the manufacturer, who shall pay the freight charges in both directions. If the test hose is satisfactory the entire lot will be examined and those complying with the specifications will be accepted.

#### AIR-BRAKE HOSE COUPLING AND GASKETS.

STANDARD.

#### Sheet M. C. B. 18-A.

In 1911 standard dimensions and contour for air-brake hose couplings and gaskets were adopted.

In 1913 the following specifications were adopted as Standard for gaskets.

#### SPECIFICATIONS FOR AIR-BRAKE HOSE GASKETS.

##### DIMENSIONS.

The dimensions of the gaskets must agree with those adopted by the Association in 1911, and all gaskets shipped must be uniform in size and section.

##### MATERIAL DESIRED.

Gaskets ordered under this specification should be made of such a compound that they will be tough and yet have enough elasticity to conform to the requirements for strength and elongation. They should sustain an ultimate load of 100 pounds, and show an elongation of original internal diameter of 350 per cent when tested as described below.

##### TESTING.

When the samples for test are received, they will be examined for size and workmanship. The gaskets will be tested in tension in a manner similar to that of the tensile test of a single link of a chain. The half-links used to pull on the gasket will each be provided with a 180 degree fillet of the same diameter at the original inner diameter of the gasket — that is, the two semi-circular fillets of the pulling links will just fill the inside of the gasket.

##### REJECTION LIMITS.

If any of the sample gaskets representing a lot should fail under a load of less than 90 pounds, or if the elongation is less than 250 per cent, the entire lot represented by the sample will be rejected. If the tensile strength of any sample tested is more than 125 pounds the lot will be rejected, unless the elongation obtained from such samples is more than 350 per cent.

If the dimensions vary more than  $\frac{1}{64}$  inch in any way from those adopted as Standard, the entire lot will be rejected.

**LABEL FOR AIR-BRAKE HOSE.****STANDARD.**

Sheet M. C. B. 18-A.

In 1902 the label for hose, as shown in the specifications for air-brake hose, was made a Standard. Revised in 1903, 1911, 1912 and 1913. The specification for its use is as follows:

Each length of hose must have vulcanized to it a standard air-brake hose label of white or red rubber as shown. The following information must be branded on the label: On the top of the badge the initials or name of road or purchaser and date of manufacture; on the bottom the name of manufacturer and serial number. In the center a monogram as shown. The label should be applied around the hose within 6 inches of one end, as shown on M. C. B. Sheet Q<sup>1</sup>. In mounting the air hose, the coupling should be applied to the end near which the label is located, so that the drawbar will not obscure the same when an inspector is on the right forward or left back side of the car.

**AIR-BRAKE DEFECT CARD.****STANDARD.**

In 1894 a Recommended Practice was adopted to use an air-brake repair card to report to division terminals such defects as are found by trainmen which require brake to be cut out. This was revised in 1898, and is now as shown on following page to be attached as near to the car number as possible.

In 1902 this was made a Standard of the Association.

In 1903 letters were substituted for figures to indicate the various defects.

In 1911 a revised defective air-brake card was adopted and the use of the card defined as follows:

If car can be placed between air-brake cars, wire this card near triple valve where it can be readily seen.

If car must not be placed between air-brake cars, wire card to brake pipe near angle cock at each end of car.

The color of defective air-brake card to be red.

The size of defective air-brake card to be  $3\frac{1}{4}$  by 9 inches, including the stub, which is  $3\frac{1}{4}$  by  $2\frac{3}{4}$  inches.

Card to be fitted with eyelet, as shown, and each card supplied with suitable wire for attaching to car.

**CLEANING AIR BRAKES.****STANDARD.**

In 1902 the following method for cleaning air brakes was adopted as Recommended Practice. Revised and advanced to standard in 1911.

**ANNUAL REPAIRS TO FREIGHT-CAR AIR BRAKES.  
INSPECTION.**

*Cleaning and Lubricating Triple Valves.*

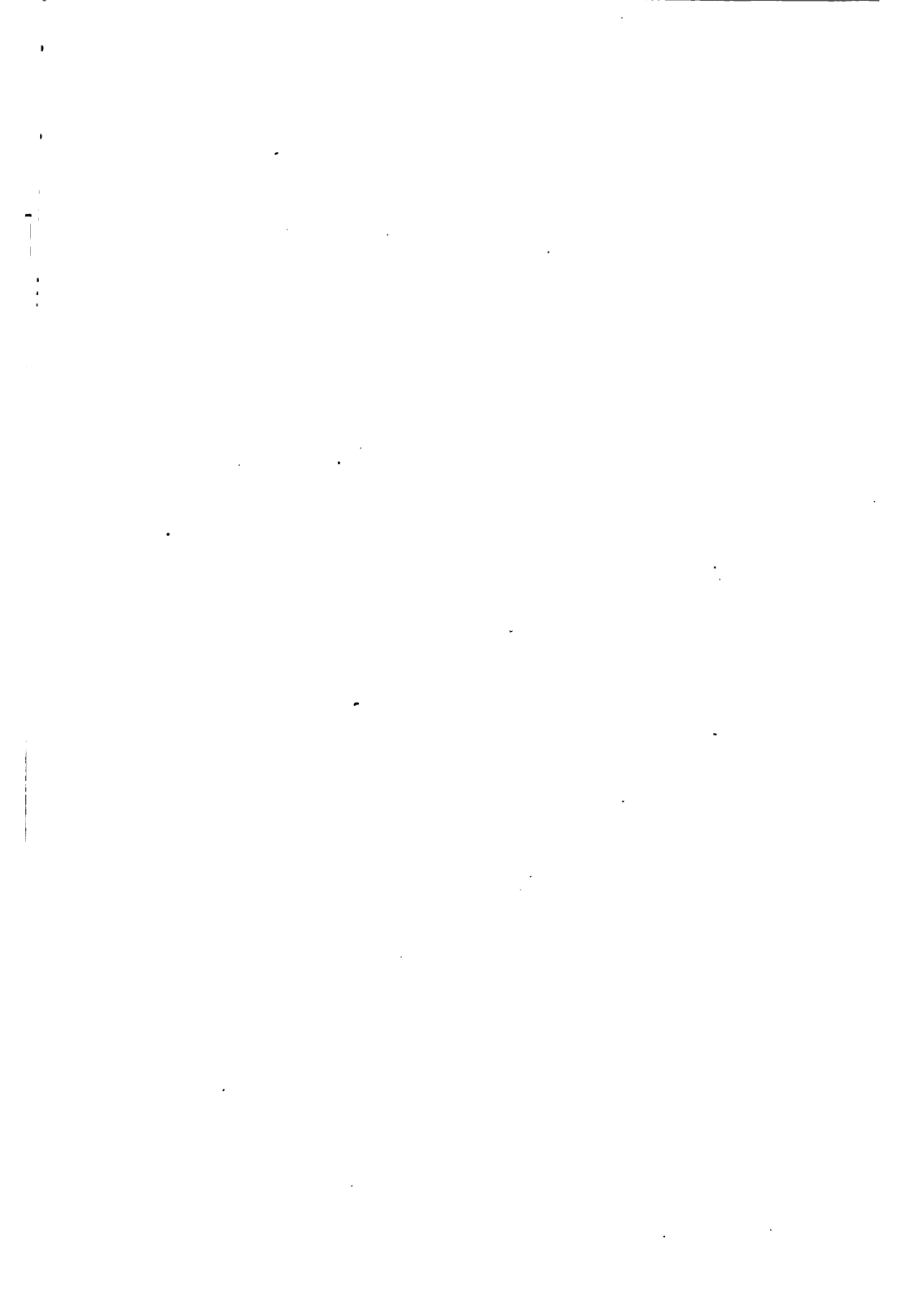
The triple valve should be removed from the car for cleaning in the shop, and should be replaced by a triple in good condition. It should be

<div style="text-align: center; font-weight: bold; font-size: 1.2em;">DEFECTIVE AIR BRAKE.</div> <div style="display: flex; justify-content: space-between;"> <div>             CAR No. _____              CARD APPLIED AT _____              BY _____              REPAIRED AT _____              BY _____           </div> <div>             INITIALS _____              TRAIN No. _____              DATE _____              GOING _____              CONDUCTOR _____              INSPECTOR _____           </div> </div>	<div style="text-align: right; font-weight: bold; font-size: 1.2em;">DEFECTIVE AIR BRAKE CARD</div> <div style="text-align: right;">             Ry. Co. _____              APPLIED TO CAR No. _____              INITIALS _____              DATE _____              CARD APPLIED AT _____              TRAIN No. _____ GOING _____              APPLIED BY _____ CONDUCTOR _____           </div> <div style="font-size: 0.8em;">             NOTE:-              USE LETTERS TO DESIGNATE DEFECTS.              SEND THIS CARD TO SUPT. MOTIVE POWER.           </div>
<div style="text-align: center; font-weight: bold; font-size: 1.2em;">DEFECTS</div> <div style="font-size: 0.8em;">             A-BRAKE PIPE              B-BRAKE WILL NOT APPLY              C-BRAKE WILL NOT RELEASE              D-TRIPLE LEAKS AT EXHAUST              E-UNDESIRABLE QUICK ACTION              F-CROSSOVER PIPE              G-BRAKE CYLINDER              H-BRAKE LEAKS OFF              J-TRAIN PIPE CLAMPS              K-BRAKE RIGGING              L-ANGLE COCK              M-RETAINER VALVE PIPE              N-RELEASE VALVE           </div> <div style="font-size: 0.8em;">             IN SERVICE              NOTE:- TO DESIGNATE THE DEFECT DRAW A LINE THROUGH DESCRIPTION BETWEEN THE STOP AND SEND IT TO THE SUPT. M.P.              IF CAR CAN BE PLACED BETWEEN AIR BRAKE CARS, TIE THIS CARD NEAR TRIPLE VALVE, WHERE IT CAN BE READILY SEEN.              IF CAR MUST NOT BE PLACED BETWEEN AIR BRAKE CARS, TIE A CARD TO THE BRAKE PIPE NEAR THE ANGLE COCK AT EACH END OF CAR.              FORWARD THIS CARD TO SUPT. MOTIVE POWER AS SOON AS BRAKES HAVE BEEN REPAIRED.           </div>	<div style="text-align: center; font-weight: bold; font-size: 1.2em;">DEFECTIVE AIR BRAKE CARD</div> <div style="text-align: center;">             Ry. Co. _____              APPLIED TO CAR No. _____              INITIALS _____              DATE _____              CARD APPLIED AT _____              TRAIN No. _____ GOING _____              APPLIED BY _____ CONDUCTOR _____           </div> <div style="font-size: 0.8em;">             NOTE:-              USE LETTERS TO DESIGNATE DEFECTS.              SEND THIS CARD TO SUPT. MOTIVE POWER.           </div>

dismantled and all the internal parts, except those with rubber seats and gaskets, cleaned with gasoline, then blown off with compressed air and wiped dry with a cloth.

The slide valve and graduating valve must be removed from the triple piston and retarded-release parts from the body in order that the service ports in the slide valve and other parts may be properly cleaned.

No hard metals should be used to remove gum or dirt or to loosen the piston-packing ring in its groove.



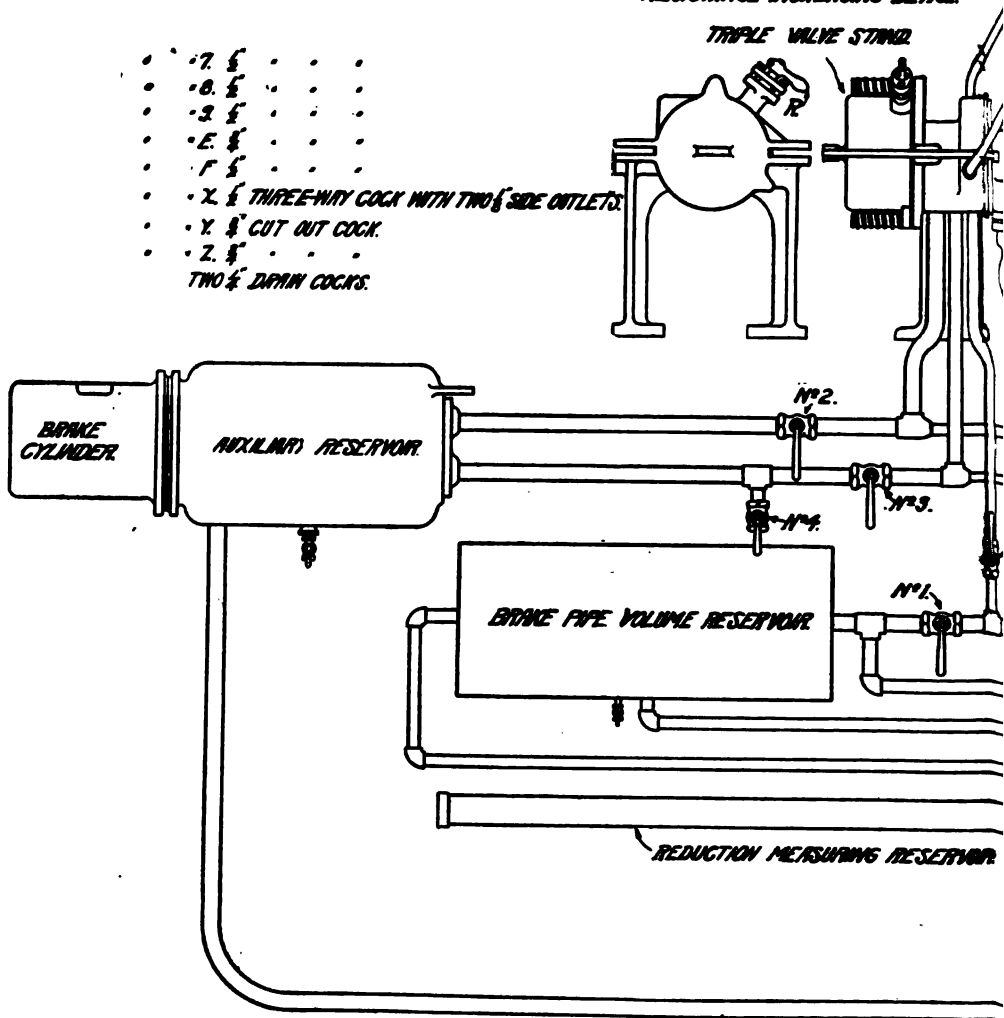
**DESCRIPTION OF COCKS REQUIRED.**  
**COCK N° 1.  $\frac{1}{2}$ " THREE-WAY COCK HAVING  $\frac{1}{2}$ " SIDE OUTLET.**

- 2.  $\frac{1}{2}$ " CUT OUT COCK.
- 3.  $\frac{1}{2}$ " " " "
- 4.  $\frac{1}{2}$ " " " "

- 7.  $\frac{1}{2}$ " " " "
- 8.  $\frac{1}{2}$ " " " "
- 9.  $\frac{1}{2}$ " " " "
- E.  $\frac{1}{2}$ " " " "
- F.  $\frac{1}{2}$ " " " "
- X.  $\frac{1}{2}$ " THREE-WAY COCK WITH TWO  $\frac{1}{2}$ " SIDE OUTLETS.
- Y.  $\frac{1}{2}$ " CUT OUT COCK.
- Z.  $\frac{1}{2}$ " " " "
- TWO  $\frac{1}{2}$ " DRAIN COCKS.**

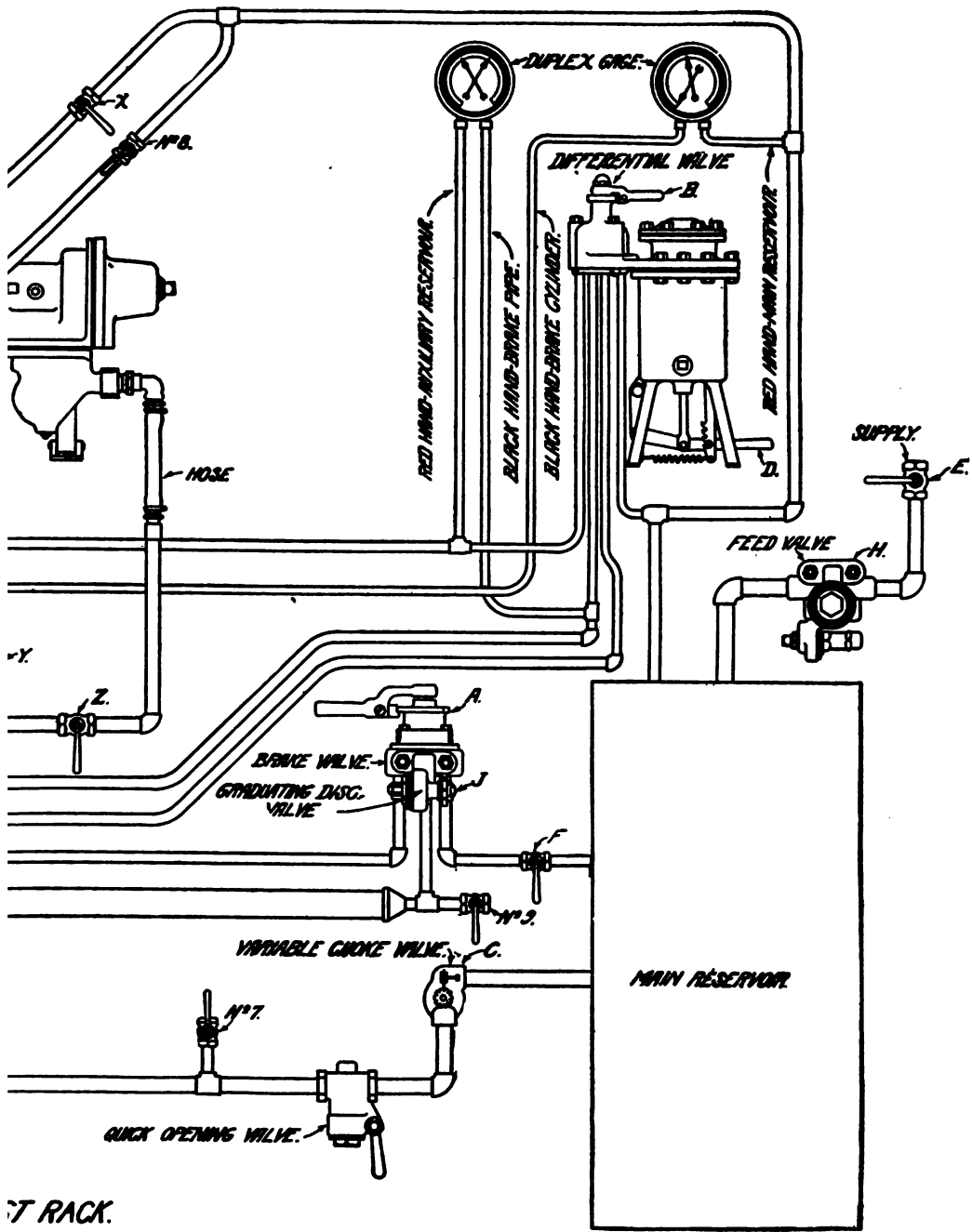
**R-HANDLE FOR OPERATING PISTON  
 RESISTANCE INCREASING DEVICE.**

**TRIPLE VALVE STAND**



**ASSEMBLY DIAGRAM, TRIPLE VALVE 2**

**FIGURE 3.**



T RACK.



The feed groove should be cleaned with a piece of wood, pointed similar to a lead-pencil. Bags or cloth should be used for cleaning purposes rather than waste, as waste invariably leaves lint on the parts on which it is used.

In removing the emergency-valve seat, care must be exercised not to bruise or distort it.

Particular attention should be given the triple-piston packing ring. It should have a neat fit in its groove in the piston, and also in the triple-piston bushing; once removed from the piston, or distorted in any manner, it should be scraped. The fit of the packing ring in its groove and bushing and the condition of the bushing should be such as to pass the prescribed tests.

The graduating stem should work freely in the guide nut. The graduating spring and the retarded-release spring in retarded-release triple valves must conform to standard dimensions and be free from corrosion. The thread portion of the graduating-stem guide should be coated with oil and graphite before reapplying it to the triple cap.

The triple-valve piston and the emergency valve must be tested on centers provided for the purpose to insure same being straight. The emergency-valve rubber seat should invariably be renewed unless it can plainly be seen to be in first-class condition, which is seldom the case. A check-valve case having cast-iron seat should be replaced with a case having a brass seat.

The cylinder-cap gasket and check-valve case gasket to be carefully examined and cleaned with a cloth; but should not be scraped. All hard or cracked gaskets to be replaced with new ones.

Standard gaskets as furnished by the air-brake manufacturers should be used. The use of home-made gaskets should be avoided, as the irregular thickness results in leakage and causes triple-piston stem to bend or break.

The tension of the slide-valve spring should be regulated so that the contour of same be such as will bring the outer end  $\frac{1}{8}$  inch higher than the bore of the bushing when the outside end of the spring touches bushing when entering.

Before assembling the parts after cleaning, the castings and ports in the body of the triple valve should be thoroughly blown out with compressed air, and all parts of the triple not elsewhere provided for known to be in good condition.

Lubricate the seat and face of the slide valve and slide-valve graduating valve with high-grade very fine dry graphite, rubbing it onto the surface and the upper portion of the bushing where the slide-valve spring bears, so as to make as much as possible adhere to and fill up the pores of the brass, leaving a very thin coating of free graphite. The parts to be lubricated with graphite must be free from oil or grease.

Rub in the graphite with a flat-pointed stick, over the end of which a piece of chamois skin has been glued. At completion of the rubbing operation, a few light blows on the slide valve will leave the desired light coating of loose graphite.

The triple-valve piston-packing ring and its cylinder should be lubricated with either a light anti-friction oil or a suitable graphite grease as follows:

Apply a light coating to the packing ring and insert the piston and its valves in the body, leaving them in release position, then lubricate the piston cylinder and move the piston back and forth several times, after which remove the surplus from the outer edge of the cylinder to avoid leaving sufficient lubricant to run on the slide valve or seat while the valve is being handled or stored ready for use.

No lubrication to be applied to the emergency piston, emergency valve or check valve.

All triple valves, after being cleaned or repaired, must be tested, preferably on a rack conforming to the attached print, and pass the test prescribed under the subject of "Triple Valve Tests" before being placed in service.

Should any of the triple-valve bushings require renewing, such work should be done by the air-brake manufacturers.

Triples in which packing rings are to be renewed, slide valve or graduating valves renewed or faced, if the latter are of slide type, should be sent to a central point or general repair station for repairs.

When applying the triple valve to the auxiliary reservoir, the gasket should be placed on the triple valve, not the reservoir.

#### CLEANING.

##### *Lubricating and Inspection of the Brake Cylinders.*

First, secure the piston rod firmly to the cylinder head, then, after removing the non-pressure head, piston rod, piston head and release spring, scrape off all deposits of gum and dirt with a putty knife or its equivalent, and thoroughly clean the removed parts and the interior of the cylinder with waste saturated with kerosene.

Packing leathers must not be soaked in kerosene oil, as same destroys the oil filler placed in the leather by the manufacturers, opening the pores of the leather and causing the same to become hard.

Particular attention to be paid to cleaning the leakage groove and the auxiliary tube. Triple valve must be removed when the auxiliary tube is being cleaned.

The expanding ring when applied in the packing leather should be a true circle and fit the entire circumference, and have an opening of from

$\frac{3}{16}$  to  $\frac{1}{4}$  inch; when removed from the cylinder the ring opening should be  $1\frac{1}{2}$  to  $1\frac{3}{16}$  inches, and with this opening, of course, will not be a true circle.

A packing leather which is worn more on one side than the other should be replaced with a new one of uniform thickness, or turned so as to bring the thin side away from the bottom of the cylinder. The piston should be turned each time the cylinder is cleaned. In putting a packing leather on piston, it should be so placed as to bring the flesh side of the leather next to the cylinder walls.

Follower studs to be firmly screwed into the piston heads, and nuts on same to be drawn up tight before replacing the piston.

The inside of the cylinder and packing leather to be lightly coated with a suitable lubricant, using not more than 4 ounces nor less than 3 ounces per cylinder.

Part of the lubricant should be placed on the expander ring and the adjacent side of the packing leather, thus permitting the air pressure to force the lubricant into the leather at each application of the brake.

No sharp tools should be used in placing the packing leather into the cylinder.

After the piston is entered, and before the cylinder head is replaced, the piston rod should be slightly rotated in all directions, about 3 inches from the center line of the cylinder, in order to be certain that the expanding ring is not out of place.

In forcing the piston to its proper position in the cylinder, the packing leather will skim from the inner walls of the cylinder any surplus lubricant that may have been applied. It has been found good practice to again extract the piston and remove the surplus lubricant.

All stencil marks to be scraped off or painted over with black paint. The place of cleaning, day, month and year to be stenciled with white paint, preferably on both sides of the cylinder or auxiliary reservoir, or if same is not readily visible, in a convenient location near the handle of the release rod.

The bolts and nuts holding the cylinder and reservoir to their respective plates and the latter to the car, to be securely tightened.

The brake cylinder to be tested for leakage after cleaning, preferably with an air gauge, which can be done by attaching the gauge to the exhaust port of the triple valve before connecting the retainer pipe, or where the latest type retainers are used the gauge can be connected to the exhaust port of the retaining valve. In either case, the gauge will indicate cylinder leakage on releasing the triple valve after making an application, and when attached to the retainer valve it will also test the retainer and retaining-valve pipe.

Brake-cylinder leakage should not exceed five pounds per minute, from an initial pressure of fifty pounds.

Each time the triple valve and the brake cylinder are cleaned, the brake pipe, brake-pipe strainer and branch pipe should be thoroughly blown out and the triple-valve strainer cleaned before recoupling the branch pipe to the triple valve. If a dirt collector is used, the plug should be removed, the accumulation blown out and the threaded portion of the plug coated with oil and graphite before replacing.

All union gaskets should be made of oil-tanned leather. The use of rubber in unions should not be permitted.

Piston travel should be adjusted to not less than  $5\frac{1}{2}$  nor more than 7 inches.

#### ADDITIONAL INSPECTION AND REPAIRS TO CARS.

When the brake cylinder and triple valve are cleaned, the following additional work should be done to the car:

Retaining valve cleaned by removing the cap, wiping or blowing out all dirt and seeing that the valve and its seat are in good condition, the retaining position exhaust port open and the valve proper is well secured to the car in a vertical position, pipe clamps applied where missing and tightened where loose, hose and angle cocks turned to their proper position. Pipe joints, air hose, release valves, angle and stop cocks should be tested by painting the parts with soapsuds while under an air pressure of not less than 70 pounds, preferably 80 pounds, and defective parts repaired or removed.

See that there are no broken or missing brake shoes, brake beams or foundation brake gear, and if the car belongs to a foreign road, a repair card should be made out covering all work that has been done and attached to the car, as per M. C. B. Rules.

The inspection and repairs which have been mentioned should be made to all cars at least once in twelve months.

#### TRIPLE-VALVE TESTS AND INSTRUCTIONS FOR OPERATING TRIPLE-VALVE TEST RACK.

##### *Mounting Triple Valves for Testing.*

With the triple-valve gasket applied to the face of the triple-valve flange, place the latter against the face of the stand in a vertical position and open cock "X" as shown on attached piping diagram, Fig. 3. Connect the brake pipe to the triple, then open cock "Z."

Before attaching triple valves suitable for use with 8-inch brake cylinders, insert in the auxiliary reservoir end of the valve the friction-increaser extension piece, suitable for the valve under test.

Two triple-valve stand face plates are required for each test rack to permit the testing of all types of freight triple valves.

Plate No. 1 is for use when testing triple valves for 8-inch cylinders.

Plate No. 2 is for triple valves used on 10-inch cylinders.

If it is found necessary to repeat any test which has necessitated a reduction of auxiliary reservoir pressure, valve "B" may be moved to position No. 2, which provides a by-pass around the triple valve from the brake pipe to the auxiliary reservoir, thereby permitting a quick recharge.

*Test No. 1.—Charging Test for Triple Valves.*

Commencing the tests with cocks 2, 3, 7 and 9 open, all other numbered cocks closed, valve "B" in position No. 3 (lap), valve "A" in position No. 1, auxiliary reservoir empty and main reservoir pressure 80 pounds pressure, proceed as follows:

Close cock No. 7 and open No. 1, and with 80 pounds pressure in the brake pipe note the time required to charge the auxiliary reservoir to specified pressure, as given in the following table:

(NOTE.—If, during this test or Test No. 2 (Leakage Test), any considerable leakage is discovered, the charging test must be repeated.)

With brake-pipe pressure maintained at 80 pounds, the triple valves should charge the auxiliary reservoir as follows:

*Charging Auxiliary Reservoir.*

Westinghouse Triple Valve.	From 0 to 30 Lbs.		From 0 to 70 Lbs.	
	Seconds.		Seconds.	
	Min.	Max.	Min.	Max.
8-inch non-quick service .....	21	28	58	78
10-inch non-quick service .....	13	17	34	44
8-inch quick service .....	32	42	100	120
10-inch quick service .....	19	24	60	72

New York Triple Valve.	From 0 to 30 Lbs.		From 0 to 70 Lbs.	
	Seconds.		Seconds.	
	Min.	Max.	Min.	Max.
18-inch non-quick service .....	.....	.....	61	82
80-inch non-quick service .....	.....	.....	46	61
1 -inch quick service .....	.....	.....	100	120
0 -inch quick service .....	.....	.....	65	80

These tests give practically the same results, and the time of charging from 0 to 30 pounds is given simply to save time in making the test.

*Test No. 2.—Leakage Test.*

Commencing each of the sections of Test No. 2, with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "B" in position No. 3 (lap), valve "A" in position No. 1 and auxiliary reservoir charged to 80 pounds, proceed as follows:

*Sec. "A," Test No. 2.—Westinghouse Triple Valves and New York Quick-service Triple Valves. Leakage at Exhaust in Emergency. Check Valve and Cylinder-cap Gasket Leakage.*

Operate the triple valve two or three times in quick action by closing and opening cock No. 1; finally leaving it closed.

Coat the exhaust port of triple valve with soapsuds to ascertain if leakage exists past the slide valve or bushing to the exhaust with the piston and slide valve in emergency position.

Close cocks 2 and 3 and note the rate of fall of pressure indicated by the brake-cylinder gauge hand, which is now connected only with the small volume between cocks 2 and 3 and the triple valve. A leakage greater than 5 pounds in 10 seconds indicates either excessive check-valve leakage or that the piston does not seal against the cylinder-cap gasket.

At the completion of this test, open cocks 2 and 3 in the order given.

*Sec. "B," Test No. 2.—Leakage at Exhaust in Release Slide Valve of Emergency-valve Leaking.*

Open cock 1, and after the brake-cylinder pressure is exhausted close cock 3 and again coat the exhaust port with soapsuds to determine if there is any leakage from the auxiliary reservoir to the brake cylinder past the slide valve when the triple valve is in release position, or from the brake pipe to the brake cylinder past the emergency valve or its seat, when the differential on the emergency valve is high. Open cock 3, then paint the body of the triple valve with soapsuds to determine if leakage exists direct to the atmosphere through castings or gaskets.

If leakage is discovered at the triple exhaust in release position, determine if it is from the auxiliary reservoir or brake pipe in the following manner:

Move valve "A" to position No. 8 and open cock 7 until the brake pipe and auxiliary reservoir are empty; then with the valve "J" in position No. 3, place a soap bubble on the exhaust port and place valve "A" in position No. 2. If no leakage is found at the exhaust, advance valve "J" by stages from position to position until a brake-pipe pressure of 10 pounds is obtained. Any leakage from the exhaust while the auxiliary reservoir is without pressure must be from brake pipe, past the emergency valve. Therefore, if no exhaust leakage is found and leakage did exist while the auxiliary reservoir was charged, it indicates defective slide valve. At the completion of this test, close cock No. 7 and move valve "A" to position No. 1, recharging auxiliary reservoir.

*Sec. "C," Test No. 2.—Graduating-valve Leakage.*

Move valve "A" to position No. 7 until a brake-cylinder pressure of from 20 to 30 pounds is obtained. Then return valve "A" to posi-

tion No. 3 and close cock 3. If the brake-cylinder pressure then increases without leakage at the exhaust port, it is proper to assume that the graduating valve is leaking, providing it has been determined by the preceding tests that the emergency valve is tight. If leakage at the exhaust occurs during this test, which will be determined by placing a soap bubble on the exhaust, the leakage may be either from slide valve or graduating valve. The rate of rise of pressure on the brake-cylinder gauge, resulting from graduating-valve leakage, must not exceed 5 pounds in 20 seconds. This comparatively rapid rate of rise is permissible owing to the extremely small volume of the section of brake-cylinder pipe into which the leakage is occurring.

At the completion of test, open cock 3 and move valve "A" to position No. 1.

*Sec. "A," Test No. 2.—Non-quick Service. New York Triple Valve. Leakage at Exhaust in Emergency. Check-valve, Quick-action Valve and Cylinder-cap Gasket Leakage.*

Operate the triple valve two or three times in quick action by closing and opening cock 1, finally leaving it closed.

Coat the exhaust port of triple valve with soapsuds to ascertain if leakage exists past the exhaust valve or bushing, with the piston and slide valve in emergency position. Close cocks 2 and 3. If the brake-cylinder gauge now indicates leakage greater than 5 pounds in 10 seconds the leakage is excessive, and is usually due to imperfect seating of the check valve or quick-action valve, or to the main piston not making a tight joint on the main cylinder gasket. To locate the defect, place soap bubbles on the vent ports. No leakage at these points indicates that the leakage is past the main cylinder gasket. If leakage is found at the vent ports, open cocks 1, 2 and 3 and recharge the auxiliary reservoir to 80 pounds, then move valve "A" to position No. 7 until the brake-pipe pressure is reduced 10 pounds and return valve "A" to position No. 3. Close cock 2, and if the quick-action valve is leaking the brake will immediately release. If it does not, the leakage is past the check valve.

At the completion of this test, if no leakage were found, open cocks 1, 2 and 3, and if leakage were discovered open cock 2 and move valve "A" to position No. 1.

*Sec. "B," Test No. 2.—Exhaust-valve Leakage in Release; also Vent-valve and Quick-action Valve Leakage.*

Close cock 3 and coat the exhaust port with soapsuds to determine if there is any leakage from the auxiliary reservoir past the exhaust valve, or graduating valve or triples having this valve tandem with the exhaust valve, when the triple is in release position. If exhaust leakage

is found, the triple under test has tandem exhaust and graduating valves, determine which valve is leaking by making graduating-valve leakage test.

*Sec. "C," Test No. 2.—Graduating-valve Leakage.*

Move valve "A" to position No. 7 until a brake-cylinder pressure of from 20 to 30 pounds is obtained. Then return valve "A" to position No. 3 and close cock 3. If the brake-cylinder pressure then increases without leakage at the exhaust port, it is proper to assume that the graduating valve is leaking. The rate of rise of pressure on the brake-cylinder gauge, resulting from graduating-valve leakage, must not exceed 5 pounds in 20 seconds. This comparatively rapid rise is permissible owing to the extremely small volume of the section of brake-cylinder pipe into which the leakage is occurring.

If leakage at the exhaust occurs during this test, which will be determined by placing a soap bubble on the exhaust, the leakage is by the exhaust valve instead of the graduating valve.

At the completion of the test open cock 3 and move valve "A" to position No. 1.

*Test No. 3.—Test of Type "K" Triple Valves for Retarded-release Feature; for Both Westinghouse and New York Triple Valves.*

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, auxiliary reservoir charged to 80 pounds, valve "B" in position No. 3 (lap), lever "D" in position No. 2 and valve "A" in position No. 3 (lap), proceed as follows:

Move valve "A" to position No. 7 until brake-pipe pressure is reduced 20 pounds, then return it to position No. 3; place valve "J" in position No. 4; valve "B" in position No. 1 and valve "A" in position No. 2. This should move the triple-valve parts to normal (full release) position.

If the triple valve moves to retarded-release position, which is indicated by a contracted exhaust and slow release of brake-cylinder pressure, it indicates a weak or broken retarded-release spring, or undue friction in the retarding device.

Following this test, recharge the system to 80 pounds by moving valve "A" to position No. 1 and valve "B" to position No. 2.

When the brake pipe and auxiliary reservoir are charged to 80 pounds move valve "A" to position No. 7 until brake-pipe pressure is reduced 20 pounds, then return it to position No. 3. Place valve "J" in notch No. 8, lever "D" in notch No. 4, valve "B" in position No. 1 and valve "A" in position No. 2.

Under these conditions the triple-valve piston and slide valve should be forced to retarded-release position. If this does not occur it indicates that the retarded-release spring is not standard, or the retarding devices have excessive friction. Completing test, place valve "B" in position 3 and valve "A" in position 1.

*Sec. "A," Test No. 4.—Application Test for Both Westinghouse and New York Triple Valves.*

If for any reason it is desired to make this test following an application and release produced by closing and opening cock 1, or the auxiliary reservoir has just been charged by opening cock 1, this test should be preceded by an application and release with valve "A," for the purpose of insuring the slide valve being in its normal position.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 2 and lever "D" in notch 3, then with the auxiliary reservoir charged to 80 pounds, proceed as follows:

To test triple valves for 8-inch cylinders, place valve "B" in position No. 4 and valve "A" in position No. 5.

To test triple valves for 10-inch cylinder, place valve "B" in position No. 4 and valve "A" in position No. 6.

In all of these tests the triple valve should move to application position without causing a discharge of air from the vent port of valve "B."

A failure to apply under the conditions specified indicates either excessive friction, which will be shown by an exhaust from the vent port or valve "B"; a leaky packing ring, which will be discovered later by the packing-ring leakage test; too large a feed groove in the cylinder, or a combination of two or more of these defects. Should the triple valve fail to apply and no exhaust occur from valve "B," the indications are that the back flow of air from the auxiliary reservoir to the brake pipe is too rapid to permit the required differential.

At the completion of this test move valve "B" to position No. 3 and valve "A" to position No. 1.

*Sec. "B."—Quick-service Test (for Quick-service Triple Valves Only) for Both Westinghouse and New York Triple Valves.*

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3 and auxiliary reservoir charged to 80 pounds, proceed as follows:

Close cock 9 and move valve "A" to position No. 7 for all 8-inch and 10-inch triple valves. The brake-cylinder pressure obtained should not be less than 5 pounds greater than that which will be obtained by subjecting to the same test triple valves which do not contain the quick-service features.

At the completion of this test move valve "A" to position No. 1 and open cock 9.

*Test No. 5.—Packing-ring Leakage Test for Both Westinghouse and New York Triples.*

**RELEASE TEST, SEC. 1.**—Commencing with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B"

in position No. 3 and the auxiliary reservoir charged to 80 pounds, proceed as follows:

Place the valve "A" in position No. 7 until the brake-pipe pressure is reduced 15 pounds, then return to position No. 3 (lap). Place valve "J" in position No. 2, lever "D" in notch No. 1 and valve "B" in position No. 1; close cocks 2 and 3 and move valve "A" to position No. 2. If the discharge does not occur promptly from the vent port of valve "B," advance valve "J" from position to position until the discharge begins, then note the rate of increase of pressure on the auxiliary reservoir gauge, which must not exceed 5 pounds in 30 seconds.

During this test there must be a steady exhaust of air from the vent port of valve "B" to insure the proper differential being maintained on the triple-valve piston. If, in making this test, the triple valve for the 8-inch cylinder releases or indicates excessive ring leakage, make another test, beginning with moving handle "R" to the right after making the proper brake-pipe reduction and before starting to increase the brake-pipe pressure. Immediately after the test is completed, handle "R" should return to its normal left position.

Should it occur that the friction of the triple valves for the 10-inch brake cylinder is so low as to continue to permit the triple to release, the reduction for the application may be changed from 15 to 10 pounds. When this is done, special attention should be given to determine if the graduating valve is right, as it must be, to permit an accurate test.

At the completion of this test place valve "B" in position No. 3, open cocks 2 and 3 and place valve "A" in position No. 1.

*Test No. 6, Sec. 2.—Friction Test. Release Test for Both Westinghouse and New York Valves.*

Commencing the test with cocks 1, 2, 3 and 9 open and all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3, auxiliary reservoir charged to 80 pounds.

Place lever "D" in notch 3 for all triple valves undergoing the test; proceed as follows:

Place valve "A" in position No. 7 until the brake-pipe pressure is reduced 10 pounds, then return it to position No. 3. Place valve "J" in position No. 1, valve "B" in position No. 1, and move valve "A" to position No. 2. Under these conditions the triple valve should release. A failure to release should be accompanied by a discharge at the vent port of valve "B," which indicates that the frictional resistance to the movement of the packing ring and slide valve is excessive.

If the triple valve does not release and valve "B" fails to open its exhaust, leakage is occurring from the brake pipe, which will necessitate advancing valve "J" from position to position, remaining in each position 30 seconds, until the triple valve releases or the exhaust in valve "B" opens.

At the completion of the test place valve "B" in position No. 3 and valve "A" in position No. 1.

*Test No. 7, Sec. "A."—Service-port Capacity Test for Westinghouse Triple Valves and Quick-service New York Triple Valves.*

Commencing with cocks 1, 2, 3, 4 and 9 open, valve "A" in position No. 1, valve "B" in position No. 3, place valve "C" in position required for the triple valve under test, as indicated:

Notch No. 1.—For 8-inch triple valves.

Notch No. 2.—For 10-inch triple valves.

During this test the brake-pipe pressure should not drop, except that in the case of the quick-service triple valves there will, of necessity, be a slight drop, which must not exceed 2 pounds.

Place valve "B" in position No. 2 and move valve "A" to position No. 3, open cock 7 until brake-pipe and auxiliary-reservoir pressures are reduced to 50 pounds, then close cock 7. Move valve "B" to position No. 3 and open combination cock 6 and quick-opening valve, leaving it open 3 seconds. This test should not produce quick action. If it does, it indicates a restriction in the service port, or a weak or graduating spring.

Sec. B.—Duplicate the tests specified under Sec. A, placing the wheel of valve "C" in the position as indicated.

Notch No. 3.—For 8-inch triple valves.

Notch No. 5.—For 10-inch triple valves, excepting Westinghouse non-quick service, with which use notch 7.

This should result in the triple valve moving to emergency position. Failure to do so indicates too close a fit of the emergency piston.

At the completion of the test close cock 4 and combination cock 6 and quick-opening valve, move valve "A" to position No. 1.

*Test No. 7, Sec. "A."—Service-port Capacity Test for New York Non-quick Service Triple Valves.*

Commencing with cocks 1, 2, 3, 4 and 9 open, valve "A" in position No. 1, valve "B" in position No. 3, place valve "C" in position required for the triple valve under test, as indicated.

Notch No. 1.—For 8-inch triple valves.

Notch No. 2.—For 10-inch triple valves.

Place valve "B" in position No. 2 and move valve "A" to position No. 3. Open cock 7 until brake pipe and auxiliary reservoir pressure are reduced to 50 pounds, then move valve "B" to position No. 3 and open cock 6 quickly.

NOTE.—During this test the triple valve should move to service position, the brake-pipe pressure must not drop and there must be no discharge of air from the vent ports.

Should the triple valve move to emergency position, it indicates a restriction in the service ports or a weak vent-valve spring.

SEC. B.—Duplicate the test specified under Sec. A, placing the wheel of valve "C" in the position as indicated for the triple valve under test.

Notch No. 3.—For 8-inch triple valves.

Notch No. 5.—For 10-inch triple valves.

This should result in the triple valve moving to emergency position, causing a strong blast of air from the vent ports and a brake-pipe reduction of at least 3 pounds. Failure to do so indicates a too loose fit of the vent-valve piston packing.

#### HEIGHT OF BRAKE STAFF.

#### STANDARD.

In 1907 a standard maximum height of brake staff, for standard box cars, from top of rail to top of brake staff of 14 feet was adopted.

#### BRAKE STAFF CARRIER IRON.

#### STANDARD.

In 1908 a Recommended Practice was adopted to use a "U"-shaped carrier iron for brake shaft bow for new cars, so that the half yoke now largely used would not be extended to new cars. Advanced to Standard in 1910.

#### AIR BRAKE AND TRAIN AIR SIGNAL INSTRUCTIONS.

#### RECOMMENDED PRACTICE.

In 1898 the Air Brake and Signal Instructions which had been in use since 1892 were slightly revised and adopted as a Recommended Practice of the Association. Revised in 1904. These instructions were also approved by the American Railway Master Mechanics' Association as originally adopted in 1892 and as revised in 1898 and 1904. For instructions in detail, also see separate pamphlet.

In 1911 Rule 121 was modified and some slight changes made in text and illustrations and the rules ordered printed in the Proceedings.

## AIR BRAKE AND TRAIN AIR SIGNAL INSTRUCTIONS.

### A.—GENERAL INSTRUCTIONS.

1. The following rules and instructions are issued for the government of all employees of this railroad whose duties bring them in contact with the maintenance or operation of the air brake and train air signal. They must be obeyed in all respects, as employees will be held responsible for the observance of same as strictly as for the performance of any other duty.

Every employee whose duties are connected in any way with the operation of the air brake will be examined from time to time as to his qualifications for such duties by the Inspector of Air Brakes or other person appointed by the proper authority, and a record will be kept of such examination.

A book of information will be issued, in convenient form, giving a complete explanation of such parts of the air brake and train air signal equipment as is deemed necessary for the care and operation of same. Any employee of this railroad whose duties require a knowledge of the operation and maintenance of the air brake and air signal will be furnished with a copy of same upon application at place designated by special notice, and every employee will be held responsible for a full knowledge of his duties in the operation or maintenance of the air brake or signal equipment.

### B.—INSTRUCTIONS TO ENGINEMEN.

Enginemen when taking charge of locomotive must see that the air-brake apparatus on engine and tender is in good working order, and that the air pump and lubricator work properly; that the devices used for regulating main reservoir and train pipe pressures are adjusted at the authorized amount; that brake valve works properly in all its positions; and that, when brakes are fully applied, with cam type of driver brake, the pistons do not travel less than 2 inches nor more than  $3\frac{1}{2}$  inches, and with other forms from 4 inches to 6 inches, and that the tender-brake piston does not travel less than 6 inches nor more than 9 inches. They must know that the air signal responds by opening hose cock on its train pipe.

Enginemen must report to roundhouse foremen, in writing, at the end of the run, any defects in the air brake or train air signal apparatus.

**MAKING UP TRAINS, TESTING BRAKES AT TERMINAL POINTS AND BEFORE STARTING DOWN SUCH GRADES AS MAY BE DESIGNATED BY SPECIAL INSTRUCTIONS.**—The train pipe under the tender must always be blown out and maximum pressure obtained in main reservoir before coupling engine to train.

After the train has been charged with air pressure, the engineman shall, at the request of the inspector or trainmen, apply the brakes with full service application and leave them so applied until all brakes operated from the engine have been inspected and the signal given to release. The

engineman must then release the brakes and must not leave the station until it has been ascertained that all brakes are released and he has been informed by the inspector, or trainmen, of the number of brakes in service and their condition. In testing passenger brakes, the American Railway Association code of train air signals for applying or releasing must be used, one of which signals must be given from the discharge valve on rear car.

Following the separation of couplings for local switching, or when engine or train has been parted for any purpose, the above test need not be complied with further than to ascertain, by test, that the rear brakes are responsive to brake valve on engine and that all brakes have properly released. However, when cars are added to train, the brakes on such cars must be inspected as in terminal test. When a passenger train back-up hose is to be used to control the train, the brakes must be applied for test with the back-up hose, and released from the brake valve on the locomotive.

4. SERVICE APPLICATION.—In applying the brakes to steady the train on descending grades, or for reducing speed for any purpose, an initial train pipe reduction of not less than five pounds must be made. Releasing brakes at low speeds must be performed with great care, dependent upon local conditions.

With freight trains, first allow the slack to run up against the locomotive. Great care must then be taken to apply the brakes with five to nine pounds reduction, according to length of train pipe, and not make a second reduction until the effect of the first reduction is felt on entire train, in order to prevent shocks which otherwise might be serious. When a freight train must be brought to a full stop, the train brake must be held applied until stop is made.

In making a service stop with a passenger train, ALWAYS RELEASE THE BRAKES A SHORT DISTANCE BEFORE COMING TO A DEAD STOP, except on heavy grades, to prevent shocks at the instant of stopping. Even on moderate grades it is best to do this, and then, after release, to apply the brakes lightly, to prevent the train starting, so that when ready to start the release will take place quickly.

5. EMERGENCY APPLICATIONS.—The emergency application of the brakes must not be used, except in actual emergencies. Under such conditions the brake valve must be left in emergency position until train has come to a full stop.

#### ENGINEMAN'S STRAIGHT AIR BRAKE VALVE ON LOCOMOTIVES.

- a — Always keep both brakes cut in and ready for operation, unless failure of some part requires cutting out.
- b — Always carry an excess pressure of ten pounds, or more, in the main reservoir, as this is necessary to insure a uniformly satisfactory operation.
- c — When using the automatic brake, keep the straight air brake valve in release position; and when using straight air, keep the automatic

brake valve in running position; this to avoid driver and tender brakes sticking.

- d — The straight air reducing valve should be kept adjusted at forty-five pounds, and the driver and tender brake safety valves at fifty-three pounds.

When a full application of straight air causes either or both safety valves to operate, it indicates that same are out of order, or too high adjustment of the reducing valve or too low adjustment of the safety valve, or leakage of same. Have them tested and adjusted.

6. BRAKES APPLIED FROM AN UNKNOWN CAUSE.— If it is found that the train is dragging as though the brakes were applied, without rapid falling of the train line pointer, the engineman must make an effort to release the brakes, which may be done as follows: First, if train pipe pressure is less than the authorized amount and the required excess pressure is carried in the main reservoir, move the handle of the brake valve to the full release position for a few seconds and then return it to the running position; secondly, should the train pipe be fully charged with pressure, apply the brakes with a five or ten pounds reduction, according to the length of the train pipe, and release the brakes in the usual manner. In case the brakes can not be released, the train must be stopped and the trainmen notified to examine the brakes.

If, however, the brakes go on suddenly with a fall of the train line pointer, it is evidence that (a) conductor's valve has been opened, (b) a hose has burst or other serious leak has occurred, or (c) the train has parted. In such an event, the locomotive throttle should be closed and the brake valve handle immediately placed on lap or emergency position, to prevent the escape of air from the main reservoir, and left there until the train has stopped and the brake apparatus has been examined and the signal to release given.

7. BRAKING BY HAND.— NEVER USE THE AIR BRAKE when it is known that the trainmen are operating the brakes of the air-brake cars by hand, except in cases of emergency, as there is danger of injury to the trainmen by so doing.

8. CUTTING OUT BRAKES.— THE DRIVER AND TENDER BRAKES MUST ALWAYS BE USED AUTOMATICALLY AT EVERY APPLICATION OF THE TRAIN BRAKE, unless defective, except upon such grades as shall be designated by special instructions.

When necessary to cut out either driver or tender brake, on account of defects, it shall be done by turning the handle of the four-way cock in the triple valve down to a position midway between a horizontal and a vertical position, first releasing the brake and leaving the bleed cock open. With the special types of triple valve, close the cut-out cock in the branch pipe.

9. DOUBLE HEADERS.— When two or more locomotives are coupled in the same train, the brakes must be connected through to and operated from the head engine. For this purpose a cock is placed in the train pipe, just

below the brake valve. Engineman of each locomotive except the head one must close this cock and carry the handle of brake valve in running position. He will start his air pump and let it run, as though he were going to use the brake, for the purpose of maintaining air pressure on his locomotive and enabling him to assume charge of the train brakes should occasion require it.

10. AN EXTRA AIR-BRAKE HOSE, COMPLETE, must always be carried on the locomotive, for repairs in case of burst hose. Upon locomotives having the air signal, a signal hose, complete, must also be carried for the same purpose.

### C.—INSTRUCTIONS TO TRAINMEN.

11. MAKING UP TRAINS AND TESTING AIR BRAKES.—When the locomotive has been coupled to the train, or when two sections have been coupled together, the brake and signal couplings must be united, the cocks in the train pipes—both brake and signal—must all be open, except those at the rear end of the last car, which must be closed, and the hose hung up properly in the dummy coupling, when cars are so equipped.

After the train has been charged with air, the engineman must then be requested to apply the brakes. When he has done so, the brakes of each car must be examined to see if they are properly applied. When it is ascertained that each brake is applied, the engineman must be signaled to release the brakes. (In testing passenger brakes the American Railway Association train air signal whistle code for applying or releasing must be used, one of which signals must be given from the discharge valve on the rear car.) The brakes of each car must then be examined to see that each is released, and the engineman informed as to the number of brakes in service and their condition.

If any defect is discovered it must be remedied and the brakes tested again—the operation being repeated until it is ascertained that everything is right. The conductor and engineman must then be notified that the brakes are all right. Following the separation of couplings for local switching, or when engine or train has been parted for any purpose, the above test need not be complied with other than to ascertain, by test, that the rear brakes are responsive to brake valve on engine and that all brakes have properly released. At point where there are no inspectors, trainmen must carry out these instructions. No passenger train must be started out from an inspection point with the brakes upon any car cut out or in a defective condition, without special orders from the proper officers. The air brakes must not be alone relied upon to control any freight train with a smaller proportion of cars with the air brake in service than provided for by special instructions. When hand brakes are also used they must be applied upon those cars next behind the air-braked cars, except in cases of emergency.

12. DETACHING LOCOMOTIVE OR CARS.—First close the cocks in the train pipes at the point of separation, and then part the couplings, invariably by hand.

13. **COUPLINGS FROZEN.**—If the couplings are found to be frozen together or covered with an accumulation of ice, the ice must first be removed and then the couplings thawed out by a torch to prevent injury to the gaskets.

14. **BRAKES STICKING.**—If brakes are found sticking, the signal "brakes sticking" must be given as hereafter prescribed by the American Railway Association, or by special rules, in which case, if the brakes can not be released from the locomotive, or if the brakes are applied to detached cars, the release may be effected by opening the bleed cock in the auxiliary reservoir until the air begins to release through the triple valve, when the reservoir cock must immediately be closed.

15. **TRAIN BREAKING INTO TWO OR MORE PARTS.**—First close the cock in the train pipe at the rear of the first section and signal the engineman to release the brakes. Having coupled to the second section, observe the rule for making up trains—first being sure that the cock in the train pipe at the rear of second section has been closed, if the train has broken into more than two sections. When the engineman has released the brakes on the second section, the same method must be employed with reference to the third section, and so on. When the train has been once more entirely united the brakes must be inspected on each car to see that all are released before proceeding.

16. **CUTTING OUT THE BRAKE ON A CAR.**—If, through any defect of the brake apparatus, it becomes necessary to cut out the brake upon any car, it may be done by closing the cock in the cross-over pipe near the center of the car where the quick-action brake is used, or by turning the handle of the cock in the triple valve to a position midway between a horizontal and a vertical, where the plain automatic brake is used, first releasing the brake. With the special types of triple valves, close the cut-out cock in the branch pipe. When the brake has been thus cut out, the cock in the auxiliary reservoir must be opened and left open upon passenger cars, or held open until all the air has escaped from the reservoir upon freight cars. **THE BRAKE MUST NEVER BE CUT OUT UPON ANY CAR UNLESS THE APPARATUS IS DEFECTIVE,** and when it is necessary to cut out a brake the conductor must notify the engineman and also send in a report stating the reason for so doing.

17. **CONDUCTOR'S VALVE.**—Should it become necessary to apply the brakes from the train, it may be done by opening the conductor's valve placed in each car so equipped. **THE VALVE MUST BE HELD OPEN UNTIL THE TRAIN COMES TO A FULL STOP, AND THEN MUST BE CLOSED AGAIN.**

This method of stopping the train must not be used except in case of emergency.

18. **BURST HOSE.**—In the event of the bursting of a brake hose, it must be replaced and the brakes tested before proceeding, provided the train be in a safe place. If it is not, the train pipe cock immediately in front of the burst hose must be closed, and the engineman signaled to release. All the brakes to the rear of the burst hose must then be released

by hand, and the train must then proceed to a safe place where the burst hose must be replaced and the brakes again connected and tested, so as to ascertain that the rear brakes are responsive, by test, to the brake valve on engine. One extra air-brake hose complete should be carried by all crews and one extra signal hose complete carried by passenger crews for repairs.

19. **BRAKES NOT IN USE.**—When the air brakes are not in use, either upon the road or in switching, the hose must be kept coupled between the cars or hung up properly to the dummy couplings, when cars are so equipped.

20. **PRESSURE-RETAINING VALVE.**—When this valve is to be used, the trainmen must, at the top of the grade, test the brakes upon the whole train, and must then pass over the train and turn the handles of the pressure-retaining valves horizontally upon all or a part of the cars, as may be directed. At the foot of the grade, the handles must all be turned downward again. Special instructions will be issued as to the grades upon which these valves are to be used.

21. **TRAIN AIR SIGNAL.**—In making up trains, all couplings and car discharge valves on the cars must be examined to see if they are tight. Should the car discharge valve upon any car be found to be defective, it may be cut out of use upon that car by closing the cock in the branch pipe leading to the valve. The conductor must always be immediately notified when the signal has been cut out upon any car, and he must report the same for repairs.

In using the signal, pull directly down upon the cord during one full second for each intended blast of the signal whistle, and allow three seconds to elapse between the pulls.

22. **REPORTING DEFECTS TO INSPECTORS.**—Any defect in either the air brake or air signal apparatus discovered must be reported to the inspector at the end of the run; or, if the defect be a serious one in passenger service, it must be reported to the nearest inspector, and it must be remedied before the car is again placed in service.

#### D.—INSTRUCTIONS TO ENGINE-HOUSE FOREMEN.

23. **GENERAL.**—It is the duty of the engine-house foremen to see that the air brake and signal equipment is properly inspected upon each locomotive after each run. It must be ascertained that all pipe joints, connections and all other parts of the apparatus are air tight, duplex gauges tested every thirty days, and that the apparatus is in good working order.

24. **AIR PUMP.**—The air pump must be tested under pressure, and if found to be working imperfectly in any respect, it must be put into thoroughly serviceable condition.

25. **PUMP GOVERNOR.**—The pump governor should cut off the steam supply to the pump when authorized pressure has been obtained.

26. **BRAKE VALVE.**—This valve must be kept clean and known to be

in working order in all its positions, before the locomotive leaves the engine-house.

27. **ADJUSTMENT OF BRAKES.**—The driver brakes must be so adjusted that the piston travel on the cam type will be not less than 2 inches nor more than  $3\frac{1}{2}$  inches, and in other forms not less than 4 inches nor more than 6 inches. When the cam brake is used care must be taken to adjust both cams alike, so that the point of contact of the cams shall be in line with the piston rod. The tender brake must be adjusted by means of the dead-truck levers, so that the piston travels not less than six inches when the air brake is applied and the hand brake is released. This adjustment must be made whenever the piston travel is found to exceed nine inches.

28. **BRAKE CYLINDERS AND TRIPLE VALVES.**—These must be examined, cleaned and lubricated at least once every six months. A record must be kept of the dates of last cleaning and lubrication of these parts for each locomotive.

29. **DRAINING.**—The main reservoir, and also the drain cup in the train pipe under the tender, must be drained of any accumulation after each trip. The auxiliary reservoirs and triple valves must also be drained frequently, and daily in cold weather, and the train pipe under the engine and tender blown out.

30. **AIR SIGNAL.**—The train air signal apparatus must be examined and tested by suitable appliances from both the head of the engine and the rear of the tender, to know that the whistle responds properly. A pressure gauge must be applied to the air signal pipe once each month, and oftener if found to be necessary, to ascertain that the reducing valve maintains the authorized pressure per square inch in the train signal pipe.

#### E.—INSTRUCTIONS TO INSPECTORS.

31. **GENERAL.**—It is the duty of all inspectors to see that the couplings, the pipe joints, the triple valves, the high speed reducing valve, the conductor's valves, the air signal valves, and all other parts of the brake and signal apparatus are in good order, of standard size for the car and free from leaks. For this purpose they must be tested under the full air pressure as used in service. No passenger train must be allowed to leave a terminal station with the brake upon any car cut out, or in a defective condition, without special orders from the proper officer.

If a defect is discovered in the brake apparatus of a freight car, which can not be held long enough to give time to correct such defect, the brake must be cut out and the car properly carded, to call the attention of the next inspector to the repairs required.

Special rules will specify the smallest proportion of freight cars, with the air brakes in good condition, which may be used in operating the train as an air brake train.

32. **MAKING UP TRAINS AND TESTING BRAKES.**—In making up trains, the couplings must be united and the cocks at the ends of the cars all

opened, except at the rear end of the last car, where the cocks must be closed; the inspector must know that the air is passing through the pipes to the rear end, and the couplings properly hung up to the dummy couplings if so equipped. After the train is fully charged the engineman must be requested to apply the brakes. When the brakes have been applied, they must be examined upon each car to see that they are applied with proper piston travel. This having been ascertained, the inspector must signal the engineman to release the brakes. (In testing passenger brakes the American Railway Association train air signal whistle code for applying or releasing must be used, one of which signals must be given from the discharge valve on the rear car.) He must then again examine the brakes upon each car to note that all have released. If any defect is discovered, it must be corrected and the testing of the brakes repeated, until they are found to work properly. The inspector must then inform both the engineman and conductor of the number of cars with brakes in good order.

This examination must be repeated if any change is made in the make-up of the train before starting.

**HIGH-SPEED REDUCING VALVES ON LOCOMOTIVES AND TENDERS** must be tested at least once every month, and adjusted to authorized pressure, if necessary, and cleaned and lubricated at least once in three months, and oftener if tests show that same is necessary.

**33. CLEANING CYLINDERS AND TRIPLE VALVES.**—The brake cylinders and triple valves must be kept clean and free from gum. They must be cleaned and lubricated as often as once in six months, upon passenger cars, and once in twelve months upon freight cars. The dates of the last cleaning and lubrication must be marked with white paint on the cylinder or reservoir, in the space left opposite the words:

Cylinder, clean and lubricated.....  
Triple, cleaned and lubricated.....

The triple valves and auxiliary reservoirs must be frequently drained, especially in cold weather, by removing the plug in the bottom of the triple valve and opening the bleed cock in the reservoir.

**34. GRADUATING SPRINGS.**—The graduating springs in the Westinghouse quick-action freight triple valves are .049 inch in diameter, nicked-steel wire, 16 coils,  $2\frac{3}{4}$  inches free height,  $\frac{29}{64}$  inch inside diameter, and in passenger .08 inch diameter, nicked-steel wire, 13 $\frac{1}{4}$  coils,  $2\frac{5}{8}$  inches free height,  $\frac{29}{64}$  inch inside diameter. The graduating springs used in the Westinghouse plain triple valve in locomotive service are made of phosphor-bronze, .083 inch in diameter, 12 coils,  $2\frac{1}{2}$  inches free height,  $\frac{29}{64}$  inch inside diameter.

**35. ADJUSTMENT OF BRAKES.**—The slack of the brake shoes must be taken up by means of the dead truck levers.

In taking up such slack it must be first ascertained that the hand brakes are off, and the slack is all taken out of the upper connections, so that the truck levers do not go back within one inch of the truck timber or other stop, when the piston of the brake cylinder is fully back at the release

position. When under a full application the brake piston travel is found to exceed nine inches upon passenger or freight cars, the brake shoe slack must be taken up and the adjustment so made that the piston shall travel not less than six inches. In taking up the brake shoe slack it must never be taken up by hand brakes. Where automatic slack adjusters are applied to any car, such adjuster must be fully released before the slack is taken up elsewhere.

36. **BRAKING POWER.**—Where the cylinder lever has more than one hole at the outer end the different holes are for use upon cars of different weights.

It must be carefully ascertained that the rods are connected to the proper holes, so that the correct braking power shall be exerted upon each car.

37. **REPAIR PARTS.**—Inspectors must keep constantly on hand for repairs a supply of all parts of the brake and signal equipment that are liable to get out of order.

38. **HANGING UP HOSE.**—Inspectors must see that, when cars are being switched or standing in the yard, the hose is coupled between the cars or properly secured in the dummy couplings, when cars are so equipped.

39. **RESPONSIBILITY OF INSPECTORS.**—Inspectors will be held strictly responsible for the good condition of all the brake and signal apparatus upon cars placed in trains at their stations; they will also make any examination of brake apparatus or repairs to the same which they may be called upon to do by trainmen.

## GENERAL QUESTIONS

### REGARDING THE USE OF THE

### AIR BRAKE AND TRAIN AIR SIGNAL.

#### GENERAL.

(All parties who have to do with the use, adjustment, care or repairs of air brakes should be thoroughly examined on these questions, in addition to the special questions for each class of men following them.)

1. Question. What is an air brake?

Answer. It is a brake applied by compressed air.

2. Q. How is the air compressed?

A. By an air pump on the locomotive.

3. Q. How does the compressed air apply the brakes?

A. It is admitted into a brake cylinder on each car, and it pushes out a piston in that cylinder, which pulls the brake on.

4. Q. How does the piston get back when the brakes are released?

A. There is a spring around the piston rod which is compressed when the brakes are applied, and when the air is allowed to escape to release the brakes, this spring reacts and pushes the piston in again.

5. Q. Where is the compressed air kept ready for use in the automatic air brakes?

A. In the main reservoir on the locomotive, in the smaller or auxiliary reservoir on each car, and in the train pipe.

6. Q. Where does the compressed air come from directly that enters into the brake cylinder when the automatic brake is applied?

A. It comes from the auxiliary reservoir on each car in service application, and from the auxiliary reservoir and train pipe in emergency application.

7. Q. How does it get into the auxiliary reservoir?

A. It is furnished from the main reservoir on the locomotive through the train pipe and triple valve when the brakes are released.

8. Q. How is the automatic brake applied and released?

A. The automatic brake is applied by reducing the air pressure in the train pipe below that in the auxiliary reservoir, and is released by raising the train pipe pressure above that remaining in the auxiliary reservoir.

9. Q. Why does the compressed air not enter directly into the brake cylinder from the train pipe?

A. Because the triple valve used with the automatic brake prevents the air from entering directly from the train pipe to the brake cylinder when the pressure in the train pipe is maintained or increased.

10. Q. What other uses has the triple valve?

A. It causes the brake cylinder to be opened to the atmosphere under each car, to release the brakes when the pressure in the train pipe is made greater than that in the auxiliary reservoir, and it opens communication from the train pipe to the auxiliary reservoir by the same movement; when the pressure in the train pipe is reduced it closes the openings from the train pipe to the auxiliary reservoir and from the brake cylinder to the atmosphere, and then opens the passage between the auxiliary reservoir and brake cylinder by the same movement, so as to admit the air and apply the brakes.

11. Q. How many forms of triple valves are there in use, and what are they called?

A. Two; the plain triple and the quick-action triple.

12. Q. How can you tell the plain triple from the quick-action triple?

A. The plain triple has a four-way cock in it, with a handle for operating the cock; the quick-action triple has no such cock in it, but there is a plug cock in the cross-over pipe leading from the train pipe to the triple, when the quick-action triple is used.

13. Q. What are these cocks for in both cases?

A. They are to be used to cut out brakes on one car, without interfering with other brakes on the train, if the brake on that car has become disabled.

14. Q. How does the cock handle stand in the plain triple when the pipe is open for automatic action?

A. It stands in a horizontal position.

15. Q. In what position does the same handle stand when the brakes are cut out by closing the cock?

A. It stands at an inclined position midway between horizontal and vertical.

16. Q. How does the handle in the plug cock in the cross-over pipe, used with the quick-action triple, stand for automatic action?

A. It stands with the handle crosswise with the pipe, and groove in plug lengthwise when cock is open.

17. Q. How does the handle and groove stand when the cock is closed and brake cut out of action?

A. It stands with the handle lengthwise of cross-over pipe, and the groove crosswise when closed.

18. Q. How is the train pipe coupled up between the cars?

A. By means of a rubber hose on each end of the train pipe, fitted with a coupling at the loose end.

19. Q. How is the train pipe closed at the rear end of train?

A. By closing the cock in the train pipe at the rear end of last car.

20. Q. How many such train pipe cocks are there to a car, on the air brake train pipe and on the air signal train pipe, and why?

A. Two for each pipe on each car, because either end of any car may sometimes be at the rear end of the train.

21. Q. How many kinds of train pipe cocks are there in use at the ends of the cars?

A. Two.

22. Q. Describe each and give the position of the handle and groove for open and closed in each case.

A. The older form of train pipe cock is a straight plug cock in the train pipe, not far from the hose connection; the handle stands crosswise with the pipe when it is open, and lengthwise with the pipe when closed; it is now found principally on the air-signal pipe. The other form of train pipe cock now used on the air brake pipe is an angle cock placed at the end of the train pipe and close to the hose. The handle of the angle cock stands lengthwise with the pipe when open, and crosswise with the pipe when closed. The groove is also a guide to tell whether open or closed.

23. Q. What uses have these train pipe cocks besides to close the pipe at the end of the train?

A. They are used to close the train pipe at both sides of any hose coupling which is to be parted, as when the train is cut in two.

24. Q. Why is it necessary to close the train pipe on both sides of the hose coupling before it is parted?

A. To prevent the escape of air from the train pipe, which would apply the brakes.

25. Q. How must the hose coupling be parted when it is necessary to do so, and why?

A. The air brake must first be released on the train from the locomotive, then the adjacent train pipe cocks must both be closed and the coupling

must be parted by hand, to prevent the possibility of injury to the rubber gasket in the coupling.

26. Q. Why must the brakes be fully released before uncoupling the hose between the cars?

A. Because if the brakes are applied upon a detached car they can not be released without bleeding the auxiliary reservoir.

27. Q. In coupling or uncoupling the hose between cars, what must be done if there is ice on the couplings?

A. The ice must first be removed and the couplings thawed out, so as to prevent injury to the rubber gaskets in uncoupling, and to insure tight joints in coupling the hose.

28. Q. What must be done with a hose coupling which is not coupled up, such as the rear hose of a train, or any hose on a car which is standing or running, but not in use?

A. It must be placed in the dummy coupling if provided for in such manner that the flat pad on the dummy will close the opening in the coupling.

29. Q. What pressure should be carried in the train pipe and auxiliary reservoir?

A. The authorized pressure, as per special instructions.

30. Q. Why should the authorized pressure be maintained?

A. Because this pressure is necessary to get the full braking force which each car is capable of using, and, if it be exceeded, there will be danger of sliding the wheels.

31. Q. How much pressure can be obtained in the brake cylinder by the service application of the brakes with seventy pounds in the auxiliary reservoir?

A. About fifty pounds to the square inch, with an 8-inch piston travel.

32. Q. Why can only fifty pounds pressure be obtained under these circumstances?

A. Because the air at seventy pounds pressure in the auxiliary reservoir expands into an additional space when the auxiliary reservoir is opened to the brake cylinder, and when the pressure has become equalized it is thus reduced to fifty pounds.

33. Q. How much must the train pipe pressure be reduced in order to get fifty pounds pressure in the brake cylinder, in ordinary service?

A. Twenty pounds.

34. Q. Can the brakes be applied so as to get only a portion of this fifty pounds pressure in the brake cylinder, and how?

A. They can be so applied by reducing the train pipe pressure less than twenty pounds.

35. Q. If the train pipe pressure be reduced ten pounds what will be the pressure in the brake cylinder?

A. About twenty-five pounds.

36. Q. How is this graduated action obtained?

A. By means of the graduating valve in the triple valve.

37. Q. Is it important to keep all the air brake apparatus tight and free from leaks?

A. Yes.

38. Q. Why is this important?

A. In order to get full service from the air brakes, and to prevent the waste of air, and also to prevent the brakes applying automatically by reason of leak in the train pipe.

39. Q. Is it important to know that the train pipe is open throughout the train and closed at the rear end before starting out?

A. Yes, this is very important.

40. Q. Why is this very important?

A. Because if any cock in the train pipe were closed, all the brakes back of the cock which is closed would be prevented from working.

41. Q. How can you ascertain that the train pipe cocks are all open when the train is made up?

A. By testing the brakes; that is, by applying and releasing them, and observing whether they all operate.

42. Q. Do you understand that no excuse will be acceptable for starting out the train without first testing the air brakes?

A. Yes.

43. Q. Why is this rule absolute?

A. Because the safety of passengers and of property depends upon the brakes being properly coupled up and in an operating condition before the train is started.

44. Q. At what other times should the brakes be tested?

A. After each change in the make-up of the train and before starting the train down certain designated grades.

45. Q. From where does the air signal apparatus receive its pressure?

A. From the main air reservoir through the reducing valve.

46. Q. How much air pressure should be carried in the air signal train pipe?

A. The authorized pressure.

47. Q. Is it important that this train pipe and its connections be also kept tight?

A. Yes.

48. Q. After taking up the slack of the brake shoes, how far should the brake piston travel in the cylinders on cars and tenders with a full application of the brake?

A. Not less than six inches, nor more than nine inches.

49. Q. What would happen if the piston traveled less than six inches when brakes are fully applied?

A. A partial application of the brakes might not force the piston beyond the leakage groove in the brake cylinder provided for the escape of small amounts of air.

50. Q. Why should the piston travel not be permitted to exceed nine inches on passenger cars, tenders or freight cars?

A. Because if it travels farther than this when sent out, a little wear of the brake shoes will cause the piston to travel far enough to rest against the back cylinder head when the brakes are applied, and this cylinder head would then take the pressure instead of its being brought upon the brake shoes.

51. Q. How far should the driver brake piston travel with a full application of the brakes, and why?

A. Not less than two inches nor more than three and one-half inches for the cam type of brake, and from four to six inches for other forms.

52. Q. If the brakes stick upon any car so that the engineman can not release them at any time, how should they be released?

A. By opening the release cock in the auxiliary reservoir and holding it open until air begins to escape from the triple valve, and then closing it again.

53. Q. What is the pressure-retaining valve, and what is its use?

A. The pressure-retaining valve is a small valve placed at the end of a pipe from the triple valve, through which the exhaust takes place from the brake cylinder. It is used to retard the brake release on heavy grades, and holds the brakes partially applied, so as to allow more time for the engineman to recharge the auxiliary reservoir.

54. Q. What precautions are necessary on every train in regard to hose couplings?

A. Every train must carry at least two extra hose and couplings complete, for use in replacing any hose couplings which may fail or become disabled. These extra hose and couplings to be carried on such part of the train as is required by the rules and regulations.

### SPECIAL FOR ENGINEMEN.

55. Q. How should the air pump be started?

A. It should be started slowly, so as to allow the condensation to escape from the steam cylinder and prevent pounding, which is more likely to occur when the air pressure is low.

56. Q. Why should the piston rod on the air pump be kept thoroughly packed?

A. To prevent the waste of air and steam.

57. Q. How should the steam cylinder of the air pump be oiled, and what kind of oil should be used?

A. It should be oiled as little as necessary through a sight-feed lubricator, and cylinder oil should be used.

58. Q. How should the air cylinder of the air pump be oiled; what kind of oil?

A. It should be supplied with valve oil as often as necessary, through a cup provided for that purpose. Also, a well-saturated swab should be

kept on the piston rod. Lard oil, and other animal or vegetable oils should not be used, as their use causes the brake valve and the triple valves to gum up. The oil must never be introduced through the air inlet ports, as this practice would cause the pump valves to gum up.

59. Q. What regulates the train pipe pressure?

A. The train pipe governor, or feed valve, provided for that purpose.

60. Q. Why should the authorized pressure be carried in train pipe?

A. Because this pressure produces the strongest safe pressure of the brake shoes upon the wheels. A higher train pipe pressure is liable to cause the wheels to slide.

61. Q. What does the feed-valve attachment on the brake valve accomplish?

A. When properly adjusted it restricts the train pipe pressure to the authorized amount, with the brake valve handle carried in running position.

62. Q. How often should the brake valve be thoroughly cleaned and oiled?

A. At least once every two months.

63. Q. If the main valve in the brake valve is unseated by dirt or by wear, what may be the result, and what should be done?

A. It may be impossible to get the excess pressure; when the brakes have been applied they may keep applying harder until full on, or when they have been applied they may release. The main valve should be thoroughly cleaned, and if worn it should be faced to a seat.

64. Q. If the piston in the brake valve becomes gummed up or corroded from neglect to clean it, what will be the result?

A. It will be necessary to make a large reduction of pressure through the preliminary exhaust port before the brakes will apply at all, and then the brakes will go on too hard and will have to be released.

65. Q. How and why should the train pipe under the tender always be blown out thoroughly before connecting up to the train?

A. By opening the angle cock at the rear end of the tender and allowing the air from the main reservoir to blow through. This blows out the oil, water, scale, etc., which may accumulate in the pipe, and which would be blown back into the train pipe and triple valves if not removed before coupling to the train.

66. Q. When the locomotive is coupled to the train, why is it necessary to have excess pressure in the main reservoir?

A. So that the brakes will all be released and the train quickly charged when the engineman's valve is placed in the release position.

67. Q. Why should the driver brakes be operated automatically with the train brake?

A. Because it adds greatly to the braking force of the train, and the brakes can be applied alike to all the wheels for ordinary stop, and in an emergency the greatest possible braking force is at once obtained by one movement of the handle.

68. Q. In making a service application of the brakes, how much reduction of the train pipe pressure from seventy pounds does it require to get the brakes full on?

A. About twenty-five pounds reduction.

69. Q. What should the first reduction be in such an application?

A. Not less than five pounds, so as to insure moving the pistons in the brake cylinders past the leakage grooves.

70. Q. What is the result of making a greater reduction of pressure than twenty-five pounds?

A. A waste of air in the train pipe, without getting any more braking force, and therefore requiring more air to release the brakes.

71. Q. How many applications of the brakes are necessary in making a stop?

A. One or two applications.

72. Q. Why is it dangerous to apply and release the brakes repeatedly in making stops?

A. Because every time the brakes are released the air in the brake cylinders is thrown away, and if it is necessary to apply them again before sufficient time has elapsed to recharge the auxiliary reservoirs the application of the brakes will be weak, and after a few such applications the brakes are almost useless on account of the air having been exhausted from the auxiliary reservoirs.

73. Q. In releasing and recharging the train, how long should the handle of the brake valve be left in the release position?

A. Until the train pipe pressure has risen nearly to authorized pressure.

74. Q. In making service stops with passenger trains, why should you release the brakes just before coming to a full stop?

A. So as to prevent stopping with a lurch; it also requires less time for the full release of the brakes after stopping.

75. Q. In making stops with freight trains, why should the brakes not be released until after the train has come to a full stop?

A. Because long freight trains are apt to be parted by releasing the brakes before rear brakes are fully released.

76. Q. In making service stops, why must the handle of the brake valve not be moved past the position for service applications?

A. So as to prevent unnecessary jerks to the train and the emergency action of the triple valve when not necessary.

77. Q. If you find the train dragging from the failure of the brakes to release, how can you release them?

A. By placing the handle of the brake valve in full release position for a few seconds and returning it to the running position, if the train pipe pressure is not up to the authorized amount; but if maximum pressure is in train pipe, the brakes should be applied with from five to ten pounds reduction, according to the length of train pipe, and released in the usual manner.

78. Q. When the brakes go on suddenly when not operated by the brake valve, and the gauge pointer falls back, what is the cause, and what should you do?

A. Either a hose has burst, or a conductor's valve has been opened, or the train has parted. In any event, the engine throttle should be closed and the handle of the brake valve should immediately be placed on lap position to prevent escape of air from main reservoir.

79. Q. Are the brakes liable to stick after an emergency application, and why?

A. The brakes are harder to release after an emergency application because they are on with full force and it requires higher pressure than usual in the train pipe to release them again. In this case it is necessary always to have in reserve the excess pressure of the main reservoir to aid in releasing the brakes. With the quick-action triple valve this is especially necessary, because air from the train pipe as well as from the auxiliary reservoir is forced into the brake cylinder when a quick application of the brake is made, thus increasing the pressure in the brake cylinder without the usual reduction of pressure in the auxiliary reservoir, and requiring a correspondingly high pressure in the train pipe afterward to cause the brakes to be released.

80. Q. In using the brakes to steady the train while descending grades, why should the air pump throttle be kept well open?

A. So that the pump may quickly accumulate a full pressure in the main reservoir for use in recharging the train pipe and auxiliary reservoir when the brakes have been released again.

81. Q. In descending a grade how can you best keep the train under control?

A. First, by commencing the application of the brakes early, so as to prevent too high a speed being reached; secondly, by making an initial reduction that will lightly apply all brakes in the train, and by slowing the train down just before it is necessary to charge the auxiliary reservoir, so as to give time enough to refill same before much speed is again attained.

82. Q. If the train is being drawn by two or more locomotives, upon which locomotives should the brakes be controlled, and what must the engineman of the other locomotive do?

A. The brakes must be controlled by the leading locomotive, and the enginemen of the following locomotives must close the cock in the train pipe just below the brake valves. The latter must always keep the pump running and in order, and main reservoir charged with pressure, with the brake valve in the running position, so that he may quickly operate the brakes if called upon to do so.

83. Q. If the air signal whistle gives only a weak blast, what is the probable cause?

A. Either the reducing valve is out of order so that the pressure is considerably less than forty pounds, or the whistle itself is filled with dirt

or not properly adjusted, or the port under the end of signal valve is partly closed by gum or dirt.

84. Q. If the reducing valve for the air signal is allowed to become clogged up with dirt, what will the result probably be?

A. The signal pipe might get the full main reservoir pressure, and the whistle will blow when the brakes are released.

85. Q. If you discover any defect in the air brake or signal apparatus while on the road, what must be done?

A. If it is something that can not be readily remedied at once, it must be reported to the Enginehouse Foreman as soon as the run is completed.

86. Q. What is the result if water be allowed to collect in the main reservoir of the brake apparatus?

A. The room taken up by the water reduces the capacity for holding air, and the brakes are more liable to stick. In cold weather also the water may freeze and prevent the brakes from working properly.

#### SPECIAL FOR ENGINE REPAIRMEN.

87. Q. How often must the air brake and signal apparatus on locomotives be examined?

A. After each trip.

88. Q. Under what pressure must it be examined?

A. Under full pressure.

89. Q. Should the train pipe pressure exceed the maximum, where would you look for the cause of the trouble?

A. In the devices controlling train pipe pressure.

90. Q. How often must the main reservoir and the drain cup under the tender be drained?

A. After each trip.

91. Q. How often must the triple valves and the cylinders of the driver and tender brakes be cleaned and lubricated?

A. They must be thoroughly cleaned and lubricated once every six months. If the driver brake cylinders are so located that they become hot from the boiler, they may require lubrication more frequently.

92. Q. If there are any leaks in the pipe joints or anywhere in the apparatus, what must you do?

A. Repair them before the locomotive goes out.

93. Q. How is the brake shoe slack of the cam driver brake taken up, and what precautions are necessary?

A. By means of the cam screws, and it is necessary to lengthen both alike, so that when the brake is applied the point of contact with the cams will be in a line with the piston rod.

94. Q. How is the brake shoe slack of driver brakes on a locomotive with more than two pairs of driving wheels taken up?

A. By means of a turnbuckle or screw in the connecting rods.

95. Q. How is the slack of the tender brake shoes taken up?

A. By means of the dead truck levers; if they will not take it up enough, it must be taken up in the underneath connection, and then adjusted by the dead lever.

96. Q. How far should the driver brake piston travel in applying the brakes?

A. Not less than two inches, nor more than three and one-half inches with the cam type of brake, and from four to six inches with other forms.

97. Q. What travel of piston should the tender brakes be adjusted for?

A. Not less than six inches nor more than nine inches, and such adjustment must be made whenever the piston travel is found to exceed eight inches.

### SPECIAL FOR TRAINMEN.

98. Q. How should you proceed to test the air brakes before starting out, after a change in the make-up of a train, or before descending certain specially designated grades?

A. After the train has been fully charged with air, the engineman must be required to apply the brakes; when he has done so the brakes must be examined upon each car to see that the air is applied and that the piston travel is not less than six nor more than nine inches. The engineman must then be required to release the brakes; after he has done so, each brake must be examined again to see that all are released. The engineman and conductor must then be notified that the brakes are all right, if they are found so. (In testing passenger brakes, the American Railway Association train air signal whistle code for applying or releasing must be used, one of which signals must be given from the discharge valve on the rear car.)

99. Q. In starting out a passenger train from an inspection point, how many cars must have the brakes in service?

A. Every car upon the train.

100. Q. When might you cut out a brake upon a passenger car?

A. Never, unless it gets out of order while on the run, in which case it must be reported to the inspector at the end of the run, or upon the first opportunity which may give sufficient time to repair it.

101. Q. If a hose bursts upon the run what must be done, if the train is in a safe place?

A. The hose must first be replaced by a good one, and the engineman then signaled to release the brakes. The train must not proceed until the brakes have been reconnected and tested upon the train to see that all are working properly.

102. Q. If the train is not in a safe place when the hose bursts, what must be done?

A. The train pipe cock immediately ahead of the burst hose must be closed and the engineman signaled to release the brakes. The brakes at

the rear of the burst hose must then be released by bleeding the auxiliary reservoirs, and the train must then proceed to a safe place to replace the hose and connect up the brakes, after which the brakes must be tested.

103. Q. If the train breaks in two, what must be done?

A. The cock in the train pipe at the rear end of the first section must be closed and the engineman signaled to release the brakes. The two parts of the train must then be coupled, the hose connected and the brakes again released by the engineman. When it is ascertained that the brakes are all released, the train may proceed.

104. Q. Explain how the pressure-retaining valves are thrown into action or thrown out of action, and when this must be done.

A. The pressure-retaining valve is thrown into action by turning the handle of the valve to a horizontal position, and it is thrown out of action again by placing this handle in a vertical position pointing downward. This handle should be placed in a horizontal position at the top of a heavy grade, and it should always be returned to a vertical position at the foot of the grade, as otherwise the brakes will drag on any cars which still have the handle of the pressure-retaining valve in the horizontal position.

105. Q. If the brake of any car is found to be defective on the run, how should you proceed to cut it out?

A. By closing the cock in the cross-over pipe of the quick-action brake, or in the triple valve of the plain automatic brake, and then opening the release cock in the auxiliary reservoir upon that car, leaving it open, if a passenger car, or holding it open until all the air has escaped from it, if a freight car.

106. Q. When it is necessary to cut out a defective brake upon a car, why should it always be cut out at the triple valve and never by the train-pipe cock at the end of the car, even if it is the last car of the train?

A. The train pipe should always be open from the locomotive to the rear end of the last car, so that if the train breaks in two the brakes will be automatically applied before the parts of the train have separated sufficiently to permit damage to be done by their coming together again, and so that the brakes may be applied with the conductor's valve upon any car.

107. Q. Should the train pipe burst under any car, what must be done?

A. The train must proceed to the nearest switching point, using the brakes upon the cars ahead of the one with the burst pipe, where the car with the burst pipe must be switched to the rear of the train; the hose must then be coupled up to the rear car and the cock at the rear end of the next to the last car opened, and the cock at the forward end of the last car closed, so that if the train should part between the last two cars the brakes will be applied.

108. Q. What is the conductor's valve, and what is its use?

A. It is a valve at the end of a pipe leading from the train-brake pipe upon each passenger car; it is to be opened from the car in any emergency when it is necessary to stop the train quickly, and only then. When used

it should be held open until the train is stopped, and then it should be closed.

109. Q. What is the air signal for, and how is it operated?

A. It is to signal the engineman, in place of the old gong signal, and it is operated by pulling directly downward on the cord and releasing immediately, allowing three full seconds to elapse between pulls.

110. Q. If the discharge valve on the air-signal system is out of order or leaking on any car, how can you cut it out?

A. By closing the cock in the branch pipe leading from the train-signal pipe to the discharge valve; to do so the handle of this cock should be placed lengthwise with the pipe.

111. Q. How is the slack taken up so as to secure the proper adjustment of piston travel?

A. By means of the dead-truck lever, and if that is not sufficient, one or more holes must be taken up in the underneath connection and the adjustment then made by the dead-truck lever. Where automatic slack adjusters are applied to any car, such adjuster must be fully released before the slack is taken up elsewhere.

#### SPECIAL FOR INSPECTORS.

112. Q. Do you understand that no passenger train may be started out with any of the brakes cut out of service?

A. I do.

113. Q. Why is it important that no leaks should exist in the air-brake service?

A. Because they would interfere with the proper working of the brakes and might cause serious damage.

114. Q. What must be done with the air brake or air-signal couplings when not unfitted to other couplings, on cars equipped with dummy couplings?

A. They must be secured in the dummy coupling, so that the face of the dummy coupling will cover the opening of the hose coupling so as to prevent dust and dirt from entering the hose.

115. Q. If the air issues from the exhaust port of the quick-action triple valve when the brakes are off, what is the cause?

A. It is probably due to dirt on the rubber-seated emergency valve.

116. Q. How often must the cylinder and triple valves be examined, cleaned and lubricated?

A. As often as once every six months on passenger cars and once in twelve months on freight cars. The dates of the last cleaning and lubrication must be marked with white paint on the cylinders.

117. Q. What is the difference between the quick-action passenger and freight triple valve?

A. The passenger triple valves have larger ports and slide valves.

118. Q. How may a passenger triple valve be distinguished?  
 A. By having one exhaust outlet, or suitable lettering designating the class of service.
119. Q. How may a freight triple valve be distinguished?  
 A. By its two exhaust outlets, one being plugged.
120. Q. When should the graduating spring of the triple valve be replaced with a new one?  
 A. When it is worn or rusted out, or not of standard size.
121. Q. To what travel of piston must the brakes be adjusted?  
 A. Not less than six inches, and this adjustment must be made whenever the piston travel is found to exceed nine inches.
122. Q. How is the slack taken up so as to secure this adjustment?  
 A. By means of the dead-truck lever, and if that is not sufficient one or more holes must be taken up in the underneath connection and the adjustment then made by the dead-truck lever. Where automatic slack adjusters are applied to any car, such adjusters must be fully released before the slack is taken up elsewhere.
123. Q. What are the different holes in the outer end of the cylinder lever for, and why must the connections be pinned to the proper hole for each car?  
 A. These holes are to enable the adjustment of the brake pressure to be made according to the weights of the different cars. The connection must be made to the proper hole in each case, according to the weight of the car, so as to give proper braking power, otherwise the brake will be inefficient, or the wheels may be slid under the cars.
124. Q. How many sizes of high-speed brake-reducing valves are there in use, and how will it be known to which size of cylinders they should be connected?  
 A. There are three sizes, namely, one for 8-inch, one for 10-inch and 12-inch, and a third for 14-inch and 16-inch cylinders, and they can be distinguished by the raised figures cast on their body.
125. Q. To what pressure must the high-speed brake-reducing valve be adjusted on passenger equipment cars?  
 A. The authorized pressure.

**AIR-BRAKE APPLIANCES.****RECOMMENDED PRACTICE.****Sheet M. C. B.—Q.**

In 1899 a Recommended Practice for the location of air brake parts on different classes of cars was adopted, as follows:

1. Location of air-brake cylinders and triple valves on box cars and other clear bottom cars.
2. Location of air-brake cylinders and triple valves on hopper gondola cars and drop bottom gondola cars.

3. Arrangement of piping for clear bottom cars, or cars of the box car type.

4. Location of main air pipe at ends of cars.

5. As to the manner of fastening air cylinder reservoirs, retaining valves, etc., to the framework of cars, the bolts fastening the cylinders and reservoirs should be either double-nutted or cottered, so as to prevent the same from working loose. The air pipes should be fastened to the framework of the car with a liberal number of clamps.

One elbow should be applied to the retaining valve pipe, it being located at the end sill of the car where pipe turns upward.

One union should be applied as close to the triple valve as practicable to permit the easy removal of same; the pipe to be carried along under side of the intermediate sill when practicable, from the triple valve to end of car, and be supported by either staples or clamps, not to exceed six feet apart.

6. In 1902 label for air-brake hose to show dates of application and removal, manufacturer's name and name of railroad company was advanced to Standard.

In 1904 the location of main air pipe and angle cock shown on Sheet G was changed to Standard, and is now shown on Sheet M. C. B. 18.

In 1913 the 10-inch air-brake cylinders for freight cars weighing between 37,000 pounds and 58,000 pounds light weight were adopted as Recommended Practice.

In 1913 the K<sup>1</sup>, for 8-inch, and the K<sup>2</sup>, for 10-inch equipment, were adopted as Recommended Practice.

#### LOCATION OF LABEL ON AIR-BRAKE HOSE.

#### RECOMMENDED PRACTICE.

Sheet M. C. B.—Q<sup>1</sup>.

In 1911 a Recommended Practice that air-brake hose should be so mounted that the label will show toward the side of car in such a position that the car inspector can readily read it.

In 1912 the drawing showing position of air-brake hose label on mounted hose on Sheet M. C. B.—Q was altered to correspond with the new design of hose label. Label redesigned in 1913 and shown on Sheet M. C. B.—Q<sup>1</sup>.

#### AIR-BRAKE TESTS.

In 1895 the following code for the guidance of the Committee on Air-Brake Tests in testing triple valves was adopted as Recommended Practice for such tests. Revised 1911.

#### CONDITION OF TESTS.

CONSTRUCTION OF RACK.—Triple valves will be tested on a rack representing the piping of a one-hundred (100) car train. All cocks, angles and connections will be as nearly as possible identical with those in train serv-

ice. The rack shall conform to blue-print No. C-11379 (Rev. 3-9-09) in the hands of the committee, which gives the proper fittings, piping, cylinders, auxiliary reservoirs, main reservoirs, automatic brake valves, etc.

**RESERVOIR CAPACITY.**—The main reservoir capacity shall be approximately 57,000 cubic inches.

The capacity of each auxiliary reservoir shall be such as will, with a pressure of 70 pounds, produce 50 pounds pressure in its brake cylinder when fully equalized in service application with 8 inches piston travel.

**AIR SUPPLY.**—The air supply for the test rack shall be obtained from a locomotive type of air compressor having a capacity of from 80 to 120 cubic feet of free air per minute. The compressor to be controlled by a single top-pump governor adjusted to maintain 110 pounds main reservoir pressure.

**BRAKE-PIPE PRESSURE.**—Tests will be made with a brake-pipe pressure of 70 pounds, except when otherwise specified.

**BRAKE-PIPE LEAKAGE.**—With brake-pipe and auxiliary reservoirs charged to 70 pounds, the section of branch pipe between the cut-out cocks and triple valves, also the triple valves, should be tested with soapsuds and leakage eliminated.

Branch pipe cut-out cocks should then be closed and brake valve placed in lap position; brake-pipe leakage should then not exceed 2 pounds per minute.

**BRAKE CYLINDERS.**—Brake-cylinder packing leathers must be maintained in good condition and free from leakage.

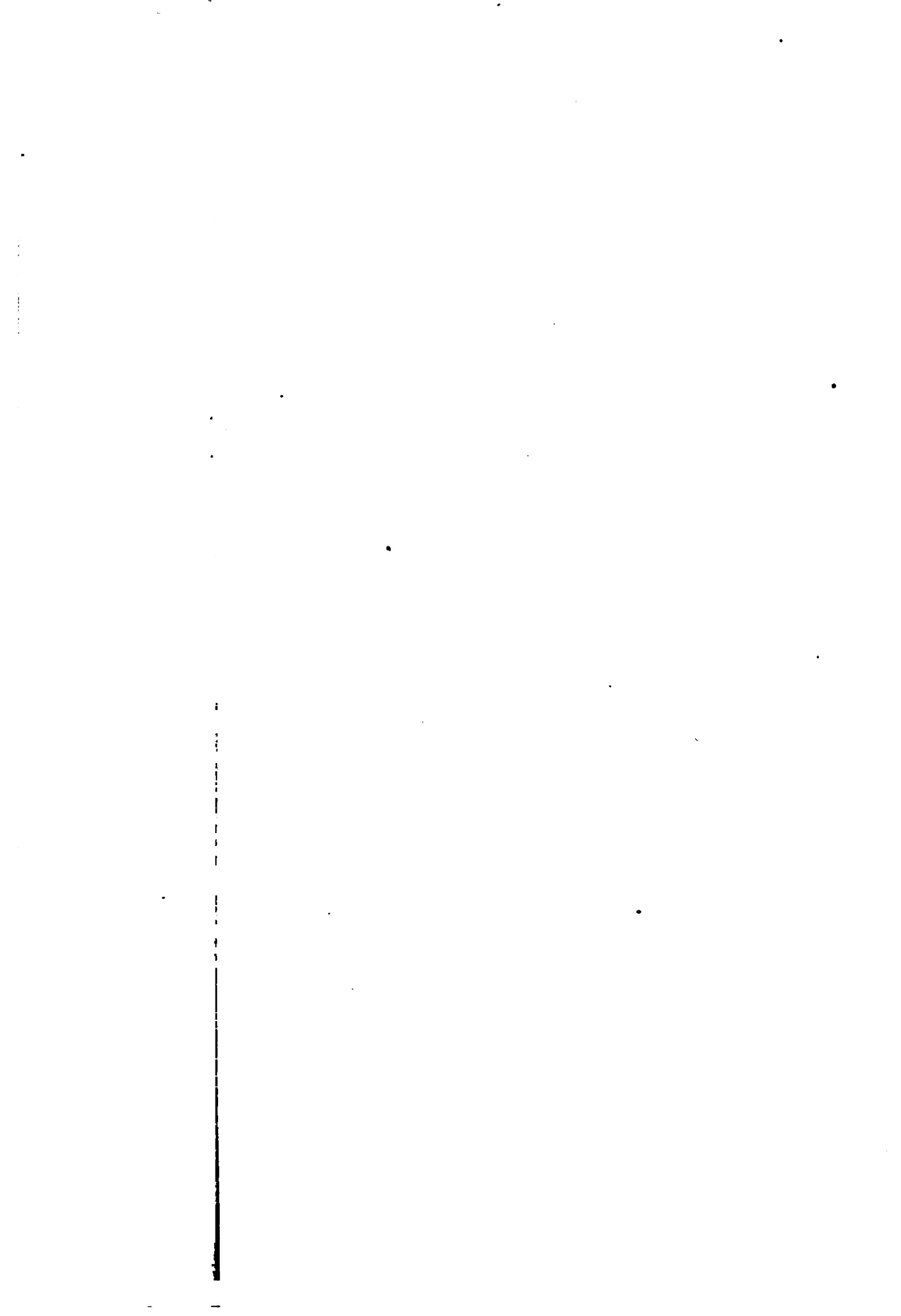
**PISTON TRAVEL.**—All tests shall be made with 8-inch piston travel, except when otherwise specified.

**CONSTRUCTION OF TRIPLE VALVES.**—Triples must be so constructed that they can be secured and operated on apparatus conforming to Diagram No. D-15611 (which shows triple-valve end of auxiliary reservoir, branch-pipe union and location of bosses for retaining-valve pipe, with detail dimensions of each, as well as detail dimensions between these parts when in the relative position they would occupy if triple valve were in place).

**GAUGES AND RECORDING INSTRUMENTS.**—The auxiliary reservoirs, brake pipe and brake cylinder of the 1st, 25th, 50th, 75th and 100th brakes shall be fitted with test gauges. All gauges must be calibrated and maintained in good condition.

Brake No. 1 shall be fitted with two recording pressure gauges, one to be connected to the brake-pipe branch pipe, the other to the brake-cylinder, and brake No. 100 shall be fitted with a test gauge connected to the brake cylinder.

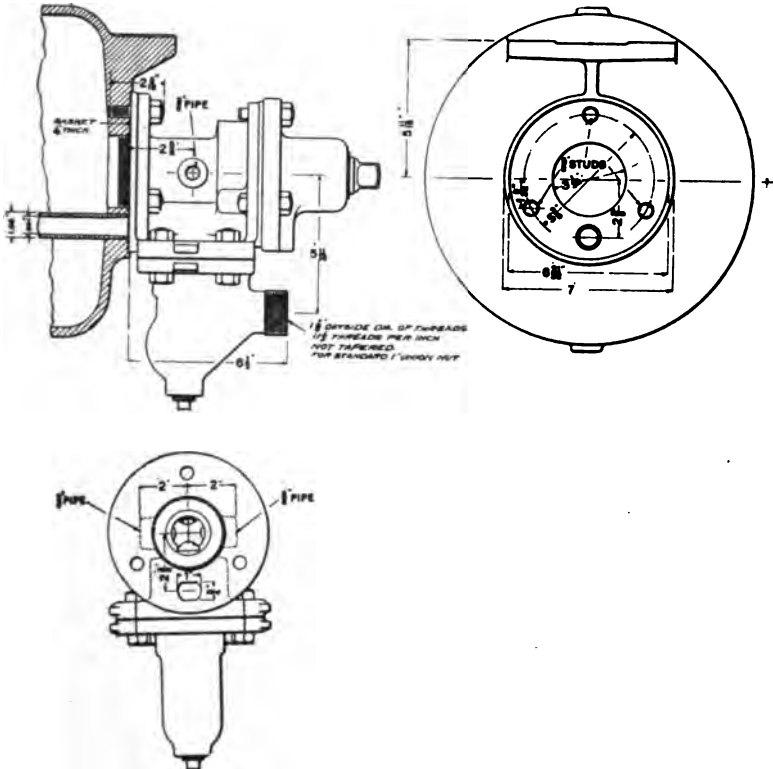
The attachment of electric circuit closers, also the general arrangement of the electric circuit wiring, shall be as shown on Plate A and Plate A-1.





**REPETITION OF TESTS.**—Tests shall be repeated three times under the same general condition, a record being taken of each test, also the average result of each three tests. The room temperature at the time of the tests shall be recorded, also humidity.

**TRIPLE-VALVE ESSENTIALS.**—The essentials of a quick-action triple valve are: first, charging; second, service application; third, graduation; fourth, release; fifth, quick action.



**H<sup>2</sup> TRIPLE VALVE ON END OF 10" FREIGHT RESERVOIR — D-15611.**

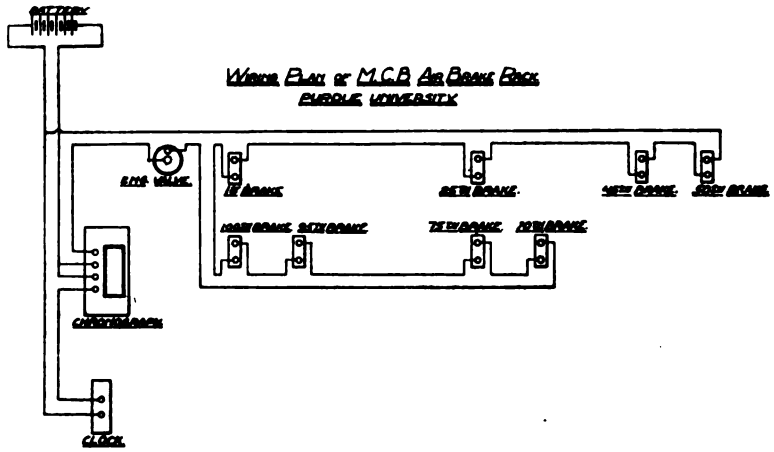


PLATE A.

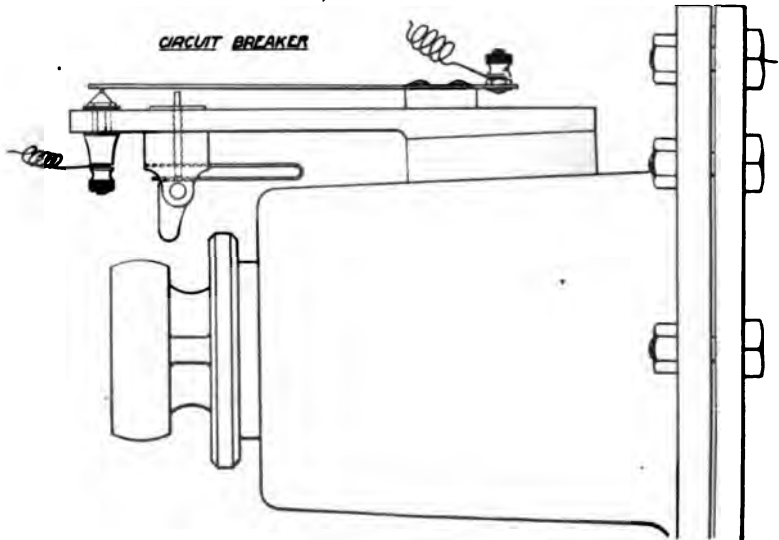


PLATE A<sup>1</sup>.

## INDIVIDUAL TRIPLE-VALVE TESTS.

### No. 1.—CHARGING TESTS.

(Time to charge auxiliary reservoir.)

Not less than three triples, selected at random, shall be tested, as follows:

With the triple valve cut out at the branch pipe cut-out cock, the auxiliary reservoir empty, and 90-pound brake-pipe pressure maintained, the triple valve should be cut in.

A. Under these conditions the auxiliary reservoir should be charged from 0 to 70 pounds in not more than 90 seconds nor less than 70 seconds.

B. When triple is in normal release position, the auxiliary reservoir should be charged from 0 to 70 lbs., in not more than 60 seconds and not less than 40 seconds.

### No. 2.—SERVICE APPLICATION TESTS.

SECTION "A."—(To determine sensitiveness to Service Application.)

1. Three valves, selected at random, shall be taken for this test and each tried separately. They will be tested on the first brake of the rack using the brake pipe only of the first car and locomotive, having the engine and tender brakes cut out.

2. These triple valves should apply in service when the brake-pipe pressure is reduced by direct discharge to the atmosphere through an orifice which will reduce brake-pipe pressure from 70 to 60 pounds, in 16 to 18 seconds, with brake valve and triple valves on locomotive and first brake cut out.

3. In preparing for this test, insert the required disk in union shown on Plate B with all cocks closed, after which open cock C and start test by opening cock B.

SECTION "B."—(Graduating Test.)

1. Three valves, selected at random, shall be taken for this test and each tried separately. They will be tested on the first brake of the rack, using the brake pipe only of the first car and locomotive having the engine and tender brakes cut out.

2. The first admission to the cylinder should be made with a reduction of brake-pipe pressure not exceeding 5 pounds; each succeeding reduction should reduce the pressure in the auxiliary reservoir not to exceed 3 pounds, until equalization takes place. The pressure in the brake pipe should not be more than 3 pounds lower than the equalized pressure in the brake cylinder and reservoir at equalization.

SECTION "C."—(Holding Test.)

Three valves, selected at random, will be taken for this test and each tried separately on the first brake on the rack, using the brake pipe only

TO BRAKE PIPE CONNECTION OF  
ENGINEERS' BRAKE VALVE

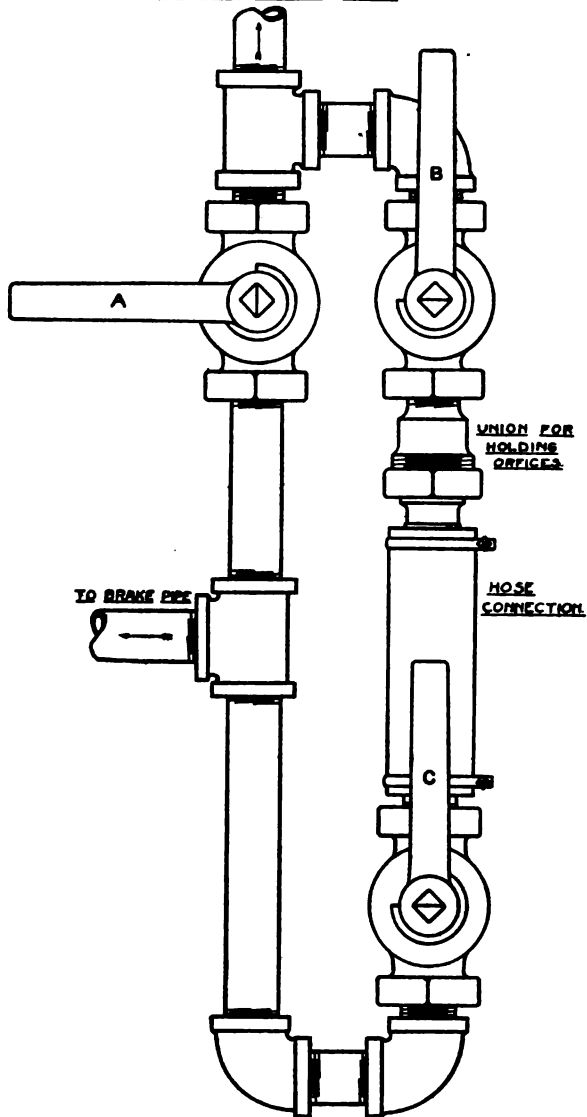


PLATE B.

of the locomotive and the first car, having the triple valves cut out on engine and tender. The one brake will be applied, admitting as nearly as may be 15 pounds into the brake cylinder following a service application. Record of pressures in the auxiliary reservoir cylinder and brake pipe will be taken as follows:

First. At completion of application.

Second. In five minutes.

Third. In ten minutes.

Fourth. In fifteen minutes.

In this test, when a constant brake-pipe pressure is maintained, the brake-cylinder pressure must not be increased more than 5 pounds in 5 minutes.

#### SECTION "D." — (Release Test.)

Three triple valves, selected at random, shall be taken for this test and each tried separately. They will be tried on the first brake of the rack, using the brake pipe only of the first car and locomotive having the engine and tender brakes cut out. When the triple goes to normal release position it must exhaust the air from the brake cylinder from 50 to 0 pounds in not more than 15 seconds.

When the triple goes to retarded-release position it must exhaust the air from the brake cylinder from 50 pounds to 0 pounds in not more than 40 seconds.

### No. 3.— EMERGENCY APPLICATION TESTS.

(To determine sensitiveness to quick action.)

Three triple valves, selected at random, shall be taken for this test and tried separately on the first brake of the rack. During this test the locomotive and tender triples are to be cut out.

SECTION "A." — These triple valves must give a quick-action application when the brake-pipe pressure is reduced by direct discharge to the atmosphere through disk with a  $\frac{1}{16}$ -inch orifice.

SECTION "B." — These triple valves must not give a quick-action application when the brake-pipe pressure is reduced by direct discharge to the atmosphere through a disk with a  $\frac{1}{16}$ -inch orifice.

SECTION "C." — (Holding Test.) Three triple valves, selected at random, shall be taken for this test and tried separately on the first brake on the rack.

The brake will be applied in quick action by moving the brake-valve handle to emergency position, where it must remain until completion of test for the purpose of insuring the discharge of all brake-pipe pressure. Record of pressure in auxiliary reservoir and brake cylinder will be taken as follows:

First.— At completion of application.

Second.— In five minutes.

Third.— In ten minutes.

Fourth.— In fifteen minutes.

In this test, the auxiliary reservoir and brake-cylinder pressure must not show a reduction of more than 5 pounds in 5 minutes.

## RACK TESTS.

### No. 4.— SERVICE APPLICATION TESTS.

#### SECTION "A." — (Service Equalization.)

With a service reduction of 25 pounds from brake-pipe pressure, a brake-cylinder pressure of not less than 48 pounds, nor more than 52 pounds, must be obtained.

#### SECTION "B." — (Graduating Test.)

1. A reduction of 5 pounds in brake-pipe pressure should apply lightly the 100 brakes. However, the brake-cylinder pressure may not be sufficient to show on all test gauges.

2. A further reduction of 4 pounds to 6 pounds should increase the cylinder pressure of all brakes.

3. A further reduction, making a total of 25 pounds, should equalize the pressure between the auxiliary reservoirs and brake cylinders.

#### SECTION "C." — (Service application time.)

Brakes will be applied by reducing brake-pipe pressure 10 pounds.

There shall not be more than 25 seconds difference in the time of obtaining 10 pounds pressure in the cylinders of the 1st and 100th brakes.

### No. 5.— EMERGENCY APPLICATION TESTS.

#### SECTION "A." — (Quick action, time and pressure.)

The 100th brake must be applied with at least 45 pounds pressure in  $6\frac{1}{4}$  seconds from the movement of the brake-valve handle to emergency position and at least 55 pounds in 7 seconds. The final maximum pressure in this test must not be less than 15 per cent nor more than 20 per cent above the pressure given by the same brake in full service application.

This test will also be made to determine that quick action is obtained with:

First.— Four inches piston travel.

Second.— Twelve inches piston travel.

(NOTE.— The object of this test is to secure, as nearly as possible, uniformity of pressures in brake cylinders in an emergency application and uniformity of time required to obtain the pressures; to secure a minimum length of stop and a minimum of shock, and of trains parting.)

**SECTION "B."**— (To determine whether quick action will follow a service application.)

Using the one hundred brakes, make a service reduction such as will give 20 pounds cylinder pressure on the first brake. Then place the brake-valve handle in emergency position, which should cause quick-action operation of all triple valves.

The pressure in the first cylinder will be increased or decreased by steps of about 5 pounds until the point at which quick action commences or ceases is determined.

**SECTION "C."**— (Quick-action jumping test.)

With brakes Nos. 1, 2 and 3 cut out, quick action should be obtained with the remainder of the brakes by an emergency reduction, and the time, from the movement of the brake-valve handle to emergency position to obtain 45 and 55 pounds cylinder pressure on the 100th brake, should not be increased more than one second over that required to obtain the same pressures with all brakes cut in.

This test should be repeated with groups of three brakes cut out, consisting of Nos. 2-3-4, 3-4-5, 4-5-6 and 5-6-7, and the time from the movement of the brake-valve handle to emergency position to obtain 45 and 55 pounds cylinder pressure in the 100th brake should be the same as with all brakes cut in.

These tests will also be made with piston travel of 4 inches.

#### **No. 6.—HOLDING TESTS.**

**SECTION "A."**— (Following a service application.)

The one hundred brakes will be applied, admitting, as nearly as may be, 15 pounds into the cylinder of the first brake. Record of pressures in the auxiliary reservoirs and cylinders will be taken at all record points as follows:

First.— At completion of application.

Second.— In five minutes.

Third.— In ten minutes.

Fourth.— In fifteen minutes.

In this test any increase of brake-cylinder pressure should be in proportion to the reduction in brake-pipe pressure due to leakage.

**SECTION "B."**— (Following a quick-action application.)

The 100 brakes will be applied in quick action by placing the brake-valve handle in emergency position, where it will be left until completion of test, for the purpose of insuring the discharge of all brake-pipe pressure. Record of pressures in auxiliary reservoirs and cylinders will be taken at all record points as follows:

First.— At completion of application.

Second.— In five minutes.

Third.— In ten minutes.

Fourth.— In fifteen minutes.

The results of this test must not indicate an excessive amount of back leakage into brake pipe.

#### No. 7.— RELEASE TESTS.

##### SECTION "A." — (Release Time.)

The 100 brakes shall be applied with an 18-pound service reduction of brake-pipe pressure and brake valve then placed in release position. Time will be taken from the movement of the brake valve into release position until pressure is reduced to 5 pounds in the cylinder of the first brake.

The pressure in the cylinder of the first brake should not reduce to 5 pounds in less than 18 seconds nor more than 25 seconds.

(NOTE.— Main reservoir pressure must be 110 pounds at time of release.)

#### SAFETY APPLIANCES.

##### SAFETY APPLIANCES.— FREIGHT-TRAIN CARS.

##### STANDARD.

##### Sheets M. C. B. 19 and 19A to 19P.

In 1893 a Recommended Practice was adopted on safety appliances under the subheads as given. In 1896 some changes were made, especially in regard to handholds, and by the elimination of various details from drawing. In 1902 it was changed to Standard.

In 1905 Sheet M. C. B. 19 was revised to more clearly define the location of safety appliances on cars. Also, the lower round of the end ladder with wooden rails was made straight instead of having an offset.

In 1906 the position of the brake shaft and location of roof handholds were modified.— Proceedings 1906.

In 1907 Sheet 19 was devoted entirely to illustrating these standards.

In 1908 a thorough revision was made of both text and drawings in order to make their meaning and intent clear and adaptable to all existing types of car equipment, and to be capable of but one interpretation.

In 1909 reference to wooden tread  $1\frac{1}{2}$  by 2 inches was omitted from Sheet on account of them not being applicable to certain types of cars.

In 1911 the United States Safety Appliance Standards, as contained in the order of the Interstate Commerce Commission, dated March 13, 1911, were adopted as standard.

## BOX AND OTHER HOUSE CARS.

## HAND BRAKES.

Each box or other house car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon. Number.

The hand brake may be of any efficient design, but must provide the same degree of safety as the design shown on Plate A.

The brake shaft shall not be less than one and one-fourth ( $1\frac{1}{4}$ ) inches in diameter, of wrought iron or steel without weld. Dimensions.

The brake wheel may be flat or dished, not less than fifteen (15), preferably sixteen (16), inches in diameter, of malleable iron, wrought iron or steel.

The hand brake shall be so located that it can be safely operated while car is in motion. Location.

The brake shaft shall be located on end of car, to the left of and not less than seventeen (17) nor more than twenty-two (22) inches from center.

There shall be not less than four (4) inches clearance around rim of brake wheel. Manner of application.

Outside edge of brake wheel shall be not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

Top brake-shaft support shall be fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolt or rivets. (See Plate A.)

A brake-shaft step shall support the lower end of brake shaft. A brake-shaft step which will permit the brake chain to drop under the brake shaft shall not be used. U-shaped form of brake-shaft step is preferred. (See Plate A.)

Brake shaft shall be arranged with a square fit at its upper end to secure the hand-brake wheel; said square fit shall be not less than seven-eighths ( $\frac{7}{8}$ ) of an inch square. Square-fit taper; nominally two (2) in twelve (12) inches. (See Plate A.)

Brake chain shall be of not less than three-eighths ( $\frac{3}{8}$ ), preferably seven-sixteenths ( $\frac{7}{16}$ ) inch, wrought iron or steel, with a link on the brake-rod end of not less than seven-sixteenths ( $\frac{7}{16}$ ), preferably one-half ( $\frac{1}{2}$ ) inch, wrought iron or steel, and shall be secured to brake-shaft drum by not less than one-half ( $\frac{1}{2}$ ) inch hexagon or square-headed bolt. Nut on said bolt shall be secured by riveting end of bolt over nut. (See Plate A.)

Lower end of brake shaft shall be provided with a trunnion of not less than three-fourths ( $\frac{3}{4}$ ), preferably one (1), inch in diameter, extend-

ing through brake-shaft step and held in operating position by a suitable cotter or ring. (See Plate A.)

Brake-shaft drum shall be not less than one and one-half ( $1\frac{1}{2}$ ) inches in diameter. (See Plate A.)

Brake ratchet wheel shall be secured to brake shaft by a key or square fit; said square fit shall be not less than one and five-sixteenths ( $1\frac{5}{16}$ ) inches square. When ratchet wheel with square fit is used, provision shall be made to prevent ratchet wheel from rising on shaft to disengage brake pawl. (See Plate A.)

Brake ratchet wheel shall be not less than five and one-fourth ( $5\frac{1}{4}$ ), preferably five and one-half ( $5\frac{1}{2}$ ), inches in diameter and shall have not less than fourteen (14), preferably sixteen (16), teeth. (See Plate A.)

If brake ratchet wheel is more than thirty-six (36) inches from brake wheel, a brake-shaft support shall be provided to support this extended upper portion of brake shaft; said brake-shaft support shall be fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts or rivets.

The brake pawl shall be pivoted upon a bolt or rivet not less than five-eighths ( $\frac{5}{8}$ ) of an inch in diameter, or upon a trunnion secured by not less than one-half ( $\frac{1}{2}$ ) inch bolt or rivet, and there shall be a rigid metal connection between brake shaft and pivot of pawl.

Brake wheel shall be held in position on brake shaft by a nut on a threaded extended end of brake-shaft; said threaded portion shall be not less than three-fourths ( $\frac{3}{4}$ ) of an inch in diameter; said nut shall be secured by riveting over or by the use of a lock-nut or suitable cotter.

Brake wheel shall be arranged with a square fit for brake shaft in hub of said wheel; taper of said fit, nominally two (2) in twelve (12) inches. (See Plate A.)

#### BRAKE STEP.

If brake step is used, it shall be not less than twenty-eight (28) inches in length. Outside edge shall be not less than eight (8) inches from face of car and not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

Brake step shall be supported by not less than two metal braces having a minimum cross-sectional area three-eighths ( $\frac{3}{8}$ ) by one and one-half ( $1\frac{1}{2}$ ) inches or equivalent, which shall be securely fastened to body of car with not less than one-half ( $\frac{1}{2}$ ) inch bolts or rivets.

#### RUNNING BOARDS.

Manner of application.

Number.

One (1) longitudinal running board.

On outside-metal-roof cars two (2) latitudinal extensions.

Longitudinal running board shall be not less than eighteen (18), preferably twenty (20), inches in width. Dimensiona.

Latitudinal extensions shall be not less than twenty-four (24) inches in width.

Full length of car, center of roof.

Location.

On outside-metal-roof cars there shall be two (2) latitudinal extensions from longitudinal running board to edge of roof above ladder locations, except on refrigerator cars where such latitudinal extensions can not be applied on account of ice hatches.

Running boards shall be continuous from end to end and not cut or hinged at any point: *Provided*, That the length and width of running boards may be made up of a number of pieces securely fastened to saddle blocks with screws or bolts. Manner of application.

The ends of longitudinal running board shall be not less than six (6) nor more than ten (10) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill; and if more than four (4) inches from edge of roof of car, shall be securely supported their full width by substantial metal braces.

Running boards shall be made of wood and securely fastened to car.

#### SILL STEPS.

Four (4).

Number.

Minimum cross-sectional area one-half ( $\frac{1}{2}$ ) by one and one-half ( $1\frac{1}{2}$ ) inches, or equivalent, of wrought iron or steel. Dimensiona.

Minimum length of tread, ten (10), preferably twelve (12), inches.

Minimum clear depth, eight (8) inches.

One (1) near each end on each side of car, so that there shall be not more than eighteen (18) inches from end of car to center of tread of sill step. Location.

Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Sill steps exceeding twenty-one (21) inches in depth shall have an additional tread. Manner of application.

Sill steps shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

#### LADDERS.

Four (4).

Number.

Minimum clear length of tread: Side ladders, sixteen (16) inches; end ladders, fourteen (14) inches. Dimensions.

Maximum spacing between ladder treads, nineteen (19) inches.

Top ladder tread shall be located not less than twelve (12) nor more than eighteen (18) inches from roof at eaves.

Spacing at ladder treads shall be uniform, within a limit of two (2) inches from top ladder tread to top tread of sill step.

Hardwood treads, minimum dimensions one and one-half ( $1\frac{1}{2}$ ) by two (2) inches.

Iron or steel treads, minimum diameter five-eighths ( $\frac{5}{8}$ ) of an inch.

Minimum clearance of treads, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

**Location.**

One (1) on each side, not more than eight (8) inches from right end of car; one (1) on each end, not more than eight (8) inches from left side of car; measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

**Manner of application.**

Metal ladders without stiles near corners of cars shall have foot guards or upward projections not less than two (2) inches in height near inside end of bottom treads.

Stiles of wooden ladders will serve as foot guards.

Ladders shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets. Three-eighths ( $\frac{3}{8}$ ) inch bolts may be used for wooden treads which are gained into stiles.

**END-LADDER CLEARANCE.**

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

**ROOF HANDHOLDS.**

**Number.**

One (1) over each ladder.

One (1) right-angle handhold may take the place of two (2) adjacent specified roof handholds, provided the dimensions and locations coincide, and that an extra leg is securely fastened to car at point of angle.

**Dimensions.**

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

On roof of car: One (1) in line with, and running parallel to, treads of each ladder, not less than eight (8), nor more than fifteen (15), inches from edge of roof, *except* on refrigerator cars where ice hatches prevent, where location shall be not less than four (4) inches from edge of roof.

Roof handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

#### SIDE HANDHOLDS.

Four (4).

Number.

[*Tread of side ladder is a side handhold.*]

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Dimensions.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

Horizontal: One (1) near each end on each side of car.

Location.

Side handholds shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, *except* as provided above, where tread of ladder is a handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Side handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

Manner of application.

#### HORIZONTAL END HANDHOLDS.

Eight (8) or more. (Four (4) on each end of car.)

Number.

[*Tread of end ladder is an end handhold.*]

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Dimensions.

Minimum clear length, sixteen (16) inches.

A handhold fourteen (14) inches in length may be used where it is impossible to use one sixteen (16) inches in length on end sills.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

One (1) near each side on each end of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, *except* as provided above, when tread of end ladder is an end handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from side of car.

Location.

One (1) near each side of each end of car on face of end sill or sheathing over end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

On each end of cars with platform end sills six (6) or more inches in width, measured from end post or siding and extending entirely across end of car, there shall be one additional end handhold not less than twenty-four (24) inches in length, located near center of car, not less than thirty (30) nor more than sixty (60) inches above platform end sill.

**Manner of application.**

Horizontal end handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

**VERTICAL END HANDHOLDS.****Number.**

Two (2) on full-width platform end-sill cars, as heretofore described.

**Dimensions.**

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Minimum clear length, eighteen (18), preferably twenty-four (24), inches.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

**Location.**

One (1) on each end of car opposite ladder, not more than eight (8) inches from side of car; clearance of bottom end of handhold shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

**Manner of application.**

Vertical end handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

**UNCOUPLING LEVERS.****Number.**

Two (2).

**Dimensions.**

Uncoupling levers may be either single or double, and of any efficient design.

Handles of uncoupling levers, *except* those shown on Plate B or of similar designs, shall be not more than six (6) inches from sides of car.

Uncoupling levers of design shown on Plate B and of similar designs shall conform to the following prescribed limits:

Handles shall be not more than twelve (12), preferably nine (9), inches from sides of cars. Center lift arms shall be not less than seven (7) inches long.

Center of eye at end of center lift arm shall be not more than three and one-half ( $3\frac{1}{2}$ ) inches beyond center of eye of uncoupling pin of coupler when horn of coupler is against the buffer block or end sill. (See Plate B.)

Ends of handles shall extend not less than four (4) inches below bottom of end sill, or shall be so constructed as to give a minimum clearance of two (2) inches around handle. Minimum drop of handles shall be twelve (12) inches; maximum, fifteen (15) inches over all. (See Plate B.)

Handles of uncoupling levers of the "rocking" or "push-down" type shall be not less than eighteen (18) inches from top of rail when lock block has released knuckle, and a suitable stop shall be provided to prevent inside arm from flying up in case of breakage.

One (1) on each end of car.

**Location.**

When single lever is used it shall be placed on left side of end of car.

# HOPPER CARS AND HIGH-SIDE GONDOLAS WITH FIXED ENDS.

*[Cars with sides more than thirty-six (36) inches above the floor are high-side cars.]*

## HAND BRAKES.

Same as specified for "Box and other house cars."	Number.
Same as specified for "Box and other house cars."	Dimensions.
Each hand brake shall be so located that it can be safely operated while car is in motion.	Location.
The brake shaft shall be located on end of car to the left of, and not more than twenty-two (22) inches from, center.	
Same as specified for "Box and other house cars."	Manner of application.

## BRAKE STEP.

Same as specified for "Box and other house cars."

## SILL STEPS.

Same as specified for "Box and other house cars."

## LADDERS.

Same as specified for "Box and other house cars."	Number.
Same as specified for "Box and other house cars," <i>except</i> that top ladder tread shall be located not more than four (4) inches from top of car.	Dimensions.
Same as specified for "Box and other house cars."	Location.
Same as specified for "Box and other house cars."	Manner of application.

## SIDE HANDHOLDS.

Same as specified for "Box and other house cars."

## HORIZONTAL END HANDHOLDS.

Same as specified for "Box and other house cars."

## VERTICAL END HANDHOLDS.

Same as specified for "Box and other house cars."

## UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

## END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

**DROP-END HIGH-SIDE GONDOLA CARS.****HAND BRAKES.**

Number.	Same as specified for "Box and other house cars."
Dimensions.	Same as specified for "Box and other house cars."
Location.	Each hand brake shall be so located that it can be safely operated while car is in motion.
	The brake shaft shall be located on end of car to the left of center.
Manner of application.	Same as specified for "Box and other house cars."

**SILL STEPS.**

Same as specified for "Box and other house cars."

**LADDERS.**

Number.	Two (2).
Dimensions.	Same as specified for "Box and other house cars," <i>except</i> that top ladder tread shall be located not more than four (4) inches from top of car.
Location.	One (1) on each side, not more than eight (8) inches from right end of car, measured from inside edge of ladder stile or clearance of ladder treads to corner of car.
Manner of application.	Same as specified for "Box and other house cars."

**SIDE HANDHOLDS.**

Same as specified for "Box and other house cars."

**HORIZONTAL END HANDHOLDS.**

Number.	Four (4).
Dimensions.	Same as specified for "Box and other house cars."
Location.	One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.
Manner of application.	Same as specified for "Box and other house cars."

**UNCOUPLING LEVERS.**

Same as specified for "Box and other house cars."

**END-LADDER CLEARANCE.**

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

**FIXED-END LOW-SIDE GONDOLA AND LOW-SIDE HOPPER CARS.**

*[Cars with sides thirty-six (36) inches or less above the floor are low-side cars.]*

**HAND BRAKES.**

Same as specified for "Box and other house cars."

**Number.**

Same as specified for "Box and other house cars."

**Dimensions.**

Each hand brake shall be so located that it can be safely operated while car is in motion. **Location.**

The brake shaft shall be located on end of car, to the left of and not more than twenty-two (22) inches from center.

Same as specified for "Box and other house cars."

**Manner of application.**

**BRAKE STEP.**

Same as specified for "Box and other house cars."

**SILL STEPS.**

Same as specified for "Box and other house cars."

**SIDE HANDHOLDS.**

Same as specified for "Box and other house cars."

**Number.**

Same as specified for "Box and other house cars."

**Dimensions.**

Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

**Location.**

Same as specified for "Box and other house cars."

**Manner of application.**

**HORIZONTAL END HANDHOLDS.**

Same as specified for "Box and other house cars."

**Number.**

Same as specified for "Box and other house cars."

**Dimensions.**

One (1) near each side on each end of car not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit. Clearance of outer end of handhold shall be not more than eight (8) inches from side of car.

**Location.**

One (1) near each side of each end of car on face of end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Same as specified for "Box and other house cars."

**Manner of application.**

**UNCOUPLING LEVERS.**

Same as specified for "Box and other house cars."

**END-LADDER CLEARANCE.**

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall

extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

#### DROP END LOW-SIDE GONDOLA CARS.

##### HAND BRAKES.

Number.	Same as specified for "Box and other house cars."
Dimensions.	Same as specified for "Box and other house cars."
Location.	Each hand brake shall be so located that it can be safely operated while car is in motion.
Manner of application.	The brake shaft shall be located on end of car to the left of center. Same as specified for "Box and other house cars."

##### SILL STEPS.

Same as specified for "Box and other house cars."

##### SIDE HANDHOLDS.

Number.	Same as specified for "Box and other house cars."
Dimensions.	Same as specified for "Box and other house cars."
Location.	Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.
Manner of application.	Same as specified for "Box and other house cars."

##### END HANDHOLDS.

Number.	Four (4).
Dimensions.	Same as specified for "Box and other house cars."
Location.	Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.
Manner of application.	Same as specified for "Box and other house cars."

##### UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

##### END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end

of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

#### FLAT CARS.

*[Cars with side twelve (12) inches or less above the floor may be equipped the same as flat cars.]*

#### HAND BRAKES.

Same as specified for "Box and other house cars."

Number.

Same as specified for "Box and other house cars."

Dimensions.

Each hand brake shall be so located that it can be safely operated while car is in motion.

Location.

The brake shaft shall be located on the end of car to the left of center.

Same as specified for "Box and other house cars."

Manner of application.

#### SILL STEPS.

Same as specified for "Box and other house cars."

#### SIDE HANDHOLDS.

Same as specified for "Box and other house cars."

Number.

Same as specified for "Box and other house cars."

Dimensions.

Horizontal: One (1) on face of each side sill near each end. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

Location.

Same as specified for "Box and other house cars."

Manner of application.

#### END HANDHOLDS.

Four (4).

Number.

Same as specified for "Box and other house cars."

Dimensions.

Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Location.

Same as specified for "Box and other house cars."

Manner of application.

#### UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

#### TANK CARS WITH SIDE PLATFORMS.

#### HAND BRAKES.

Same as specified for "Box and other house cars."

Number.

Same as specified for "Box and other house cars."

Dimensions.

Each hand brake shall be so located that it can be safely operated while car is in motion.

Location.

Manner of application.

The brake shaft shall be located on end of car to the left of center. Same as specified for "Box and other house cars."

#### SILL STEPS.

Same as specified for "Box and other house cars."

#### SIDE HANDHOLDS.

Number.

Four (4) or more.

Dimensions.

Same as specified for "Box and other house cars."

Location.

Horizontal: One (1) on face of each side sill near each end. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If side safety railings are attached to tank bands, four (4) additional vertical handholds shall be applied, one (1) over each sill step and securely fastened to tank or tank bands.

Manner of application.

Same as specified for "Box and other house cars."

#### END HANDHOLDS.

Number.

Four (4).

Dimensions.

Same as specified for "Box and other house cars."

Location.

Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application.

Same as specified for "Box and other house cars."

#### TANK-HEAD HANDHOLDS.

Number.

Two (2). [*Not required if safety railing runs around ends of tank.*]

Dimensions.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel. Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches. Clear length of handholds shall extend to within six (6) inches of outer diameter of tank at point of application.

Location.

Horizontal: One (1) across each head of tank, not less than thirty (30) nor more than sixty (60) inches above platform.

Manner of application.

Tank-head handholds shall be securely fastened.

#### SAFETY RAILINGS.

Number.

One (1) continuous safety railing running around sides and ends of tank, securely fastened to tank or tank bands at ends and sides of tank; or two (2) running full length of tank at sides of car supported by posts.

Dimensions.

Not less than three-fourths ( $\frac{3}{4}$ ) of an inch, iron.

Location.

Running full length of tank, either at side supported by posts or securely fastened to tank or tank bands, not less than thirty (30) nor more than sixty (60) inches above platform.

Manner of application.

Safety railings shall be securely fastened to tank body, tank bands or posts.

#### UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

**END-LADDER CLEARANCE.**

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake-shaft brackets, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

**TANK CARS WITHOUT SIDE SILLS AND TANK CARS WITH SHORT SIDE SILLS AND END PLATFORMS.**

**HAND BRAKES.**

Same as specified for "Box and other house cars."	Number.
Same as specified for "Box and other house cars."	Dimensions.
Each hand brake shall be so located that it can be safely operated while car is in motion.	Location.
The brake shaft shall be located on end of car to the left of center.	Manner of application.
Same as specified for "Box and other house cars."	

**RUNNING BOARDS.**

One (1) continuous running board around sides and ends; or two (2) running full length of tank, one (1) on each side.	Number.
Minimum width on sides, ten (10) inches.	Dimensions.
Minimum width on ends, (6) inches.	
Continuous around sides and ends of cars. On tank cars having end platforms extending to bolsters, running boards shall extend from center to center of bolsters, one (1) on each side.	Location.
If side running boards are applied below center of tank, outside edge of running boards shall extend not less than seven (7) inches beyond bulge of tank.	Manner of application.

The running boards at ends of car shall be not less than six (6) inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or backstop.

Running boards shall be securely fastened to tank or tank bands.

**SILL STEPS.**

Same as specified for "Box and other house cars."	Number.
Same as specified for "Box and other house cars."	Dimensions.
One (1) near each end on each side under side handhold.	Location.
Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of car.	
Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.	
Same as specified for "Box and other house cars."	Manner of application.

## LADDERS.

*[If running boards are so located as to make ladders necessary.]*

Number.	Two (2) on cars with continuous running boards. Four (4) on cars with side running boards.
Dimensions.	Minimum clear length of tread, ten (10) inches. Maximum spacing of treads, nineteen (19) inches. Hardwood treads, minimum dimensions one and one-half (1½) by two (2) inches. Wrought-iron or steel treads, minimum diameter five-eighths (⅝) of an inch. Minimum clearance, two (2), preferably two and one-half (2½), inches.
Location.	On cars with continuous running boards, one (1) at right end of each side. On cars with side running boards, one (1) at each end of each running board.
Manner of application.	Ladders shall be securely fastened with not less than one-half (½) inch bolts or rivets.

## SIDE HANDHOLDS.

Number.	Four (4) or more.
Dimensions.	Same as specified for "Box and other house cars."
Location.	Horizontal: One (1) on face of each side sill near each end on tank cars with short side sills, or one (1) attached to top of running board projecting outward above sill steps or ladders on tank cars without side sills. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car. If side safety railings are attached to tank or tank bands, four (4) additional vertical handholds shall be applied, one (1) over each sill step and securely fastened to tank or tank bands.
Manner of application.	Same as specified for "Box and other house cars."

## END HANDHOLDS.

Number.	Four (4).
Dimensions.	Same as specified for "Box and other house cars."
Location.	Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.
Manner of application.	Same as specified for "Box and other house cars."

## TANK-HEAD HANDHOLDS.

Number.	Two (2). <i>[Not required if safety railing runs around ends of tank.]</i>
Dimensions.	Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel. Minimum clearance, two (2), preferably two and one-half (2½), inches.
Location.	Horizontal: One (1) across each head of tank, not less than thirty (30) nor more than sixty (60) inches above platform on running board.

Clear length of handholds shall extend to within six (6) inches of outer diameter of tank at point of application.

Tank-head handholds shall be securely fastened.

Manner of application.

#### SAFETY RAILINGS.

One (1) running around sides and ends of tank, or two (2) running full length of tank. Number.

Minimum diameter, seven-eighths ( $\frac{7}{8}$ ) of an inch, wrought iron or steel. Dimensions.

Minimum clearance, two and one-half ( $2\frac{1}{2}$ ) inches.

Running full length of tank, not less than thirty (30) nor more than sixty (60) inches above platform or running board. Location.

Safety railings shall be securely fastened to tank or tank bands and secured against end-shifting. Manner of application.

#### UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

#### END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake-shaft brackets, brake wheel, running boards or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

#### TANK CARS WITHOUT END SILLS.

##### HAND BRAKES.

Same as specified for "Box and other house cars."

Number.

Same as specified for "Box and other house cars."

Dimensions.

Each hand brake shall be so located that it can be safely operated while car is in motion. The brake shaft shall be located on end of car to the left of center. Location.

Same as specified for "Box and other house cars."

Manner of application.

##### BRAKE STEP.

Same as specified for "Box and other house cars."

##### RUNNING BOARDS.

One (1).

Number.

Minimum width on sides, ten (10) inches.

Dimensions.

Minimum width on ends, six (6) inches.

Continuous around sides and ends of tank.

Location.

**Manner of application.**

If running boards are applied below center of tank, outside edge of running boards shall extend not less than seven (7) inches beyond bulge of tank.

Running boards at ends of car shall be not less than six (6) inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or backstop.

Running board shall be securely fastened to tank or tank bands.

**SILL STEPS.****Number.**

Four (4). [*If tank has high running boards, making ladders necessary, sill steps must meet ladder requirements.*]

**Dimensions.**

Same as specified for "Box and other house cars."

**Location.**

One (1) near each end on each side, flush with outside edge of running board, as near end of car as practicable.

Tread not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

**Manner of application.**

Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Sill steps shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with one-half ( $\frac{1}{2}$ ) inch rivets.

**SIDE HANDHOLDS.****Number.**

Four (4) or more.

**Dimensions.**

Same as specified for "Box and other house cars."

**Location.**

Horizontal: One (1) near each end on each side of car over sill step, on running board, projecting downward not more than two (2) inches from outside edge of running board.

Where such side handholds are more than eighteen (18) inches from end of car, an additional handhold must be placed near each end on each side not more than thirty (30) inches above center line of coupler.

Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If safety railings are on tank, four (4) additional vertical handholds shall be applied, one (1) over each sill step on tank.

**Manner of application.**

Same as specified for "Box and other house cars."

**END HANDHOLDS.****Number.**

Four (4).

**Dimensions.**

Same as specified for "Box and other house cars."

**Location.**

Horizontal: One (1) near each side on each end of car on running board, projecting downward not more than two (2) inches from edge of running board, or on end of tank not more than thirty (30) inches above center line of coupler.

**Manner of application.**

Same as specified for "Box and other house cars."

## SAFETY RAILINGS.

One (1).	Number.
Minimum diameter, seven-eighths ( $\frac{7}{8}$ ) of an inch, wrought iron or steel.	Dimensions.
Minimum clearance, two and one-half ( $2\frac{1}{2}$ ) inches.	
Safety railings shall be continuous around sides and ends of car, not less than thirty (30) nor more than sixty (60) inches above running board.	Location.
Safety railings shall be securely fastened to tank or tank bands, and secured against end-shifting.	Manner of application.

## UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."	Number.
Same as specified for "Box and other house cars," <i>except</i> that minimum length of uncoupling lever shall be forty-two (42) inches, measured from center line of end of car to handle of lever.	Dimensions.
Same as specified for "Box and other house cars," <i>except</i> that uncoupling lever shall be not more than thirty (30) inches above center line of coupler.	Location.

## END-LADDER CLEARANCE.

No part of car above buffer block within thirty (30) inches from side of car, *except* brake shaft, brake-shaft brackets, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or back-stop, and no other part of end of car or fixtures on same, above buffer block, other than exceptions herein noted, shall extend beyond the face of buffer block.

## CABOOSE CARS WITH PLATFORMS.

## HAND BRAKES.

Each caboose car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.	Number.
The hand brake may be of an efficient design, but must provide the same degree of safety as the design shown on Plate A.	
Same as specified for "Box and other house cars."	Dimensions.
Each hand brake shall be so located that it can be safely operated while car is in motion.	Location.
The brake shaft on caboose cars with platforms shall be located on platform to the left of center.	
Same as specified for "Box and other house cars."	Manner of application.

## RUNNING BOARDS.

Number.	One (1) longitudinal running board.
Dimensions.	Same as specified for "Box and other house cars."
Location.	Full length of car, center of roof. [ <i>On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.</i> ] Outside metal-roof cars shall have longitudinal extensions leading to ladder locations.
Manner of application.	Same as specified for "Box and other house cars."

## LADDERS.

Number.	Two (2).
Dimensions.	None specified.
Location.	One (1) on each end.
Manner of application.	Same as specified for "Box and other house cars."

## ROOF HANDHOLDS.

Number.	One (1) over each ladder. Where stiles of ladders extend twelve (12) inches or more above roof, no other roof handholds are required.
Dimensions.	Same as specified for "Box and other house cars."
Location.	On roof of caboose, in line with and running parallel to treads of ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof.
Manner of application.	Same as specified for "Box and other house cars."

## CUPOLA HANDHOLDS.

Number.	One (1) or more.
Dimensions.	Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel. Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.
Location.	One (1) continuous handhold extending around top of cupola, not more than three (3) inches from edge of cupola roof. Four (4) right-angle handholds, one (1) at each corner, not less than sixteen (16) inches in clear length from point of angle, may take the place of the one (1) continuous handhold specified, if locations coincide.
Manner of application.	Cupola handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

## SIDE HANDHOLDS.

Number.	Four (4).
Dimensions.	Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel. Minimum clear length, thirty-six (36) inches. Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.
Location.	One (1) near each end on each side of car, curving downward toward center of car from a point not less than thirty (30) inches above plat-

form to a point not more than eight (8) inches from bottom of car. Top end of handhold shall be not more than eight (8) inches from outside face of end sheathing.

Same as specified for "Box and other house cars."

Manner of application.

#### END HANDHOLDS.

Four (4).

Number.

Same as specified for "Box and other house cars."

Dimensions.

Horizontal: One (1) near each side on each end of car on face of platform end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from end of platform end sill.

Location.

Same as specified for "Box and other house cars."

Manner of application.

#### END PLATFORM HANDHOLDS.

Four (4).

Number.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Dimensions.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ) inches.

One (1) right-angle handhold on each side of each end, extending horizontally from door post to corner of car at approximate height of platform rail, then downward to within twelve (12) inches of bottom of car.

Location.

Handholds shall be securely fastened with bolts, screws or rivets.

Manner of application.

#### CABOOSE-PLATFORM STEPS.

Safe and suitable box steps leading to caboose platforms shall be provided at each corner of caboose.

Lower tread of step shall be not more than twenty-four (24) inches above top of rail.

#### UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

#### CABOOSE CARS WITHOUT PLATFORMS.

##### HAND BRAKES.

Same as specified for "Box and other house cars."

Number.

Same as specified for "Box and other house cars."

Dimensions.

Each hand brake shall be so located that it can be safely operated while car is in motion.

Location.

The brake shaft on caboose cars without platforms shall be located on end of car to the left of center.

Same as specified for "Box and other house cars."

Manner of application.

##### BRAKE STEP.

Same as specified for "Box and other house cars."

## RUNNING BOARDS.

Number.	Same as specified for "Box and other house cars."
Dimensions.	Same as specified for "Box and other house cars."
Location.	Full length of car, center of roof. [ <i>On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.</i> ] Outside metal-roof cars shall have latitudinal extensions leading to ladder locations.
Manner of application.	Same as specified for "Box and other house cars."

## SILL STEPS.

Same as specified for "Box and other house cars."

## SIDE-DOOR STEPS.

Number.	Two (2) [ <i>if caboose has side doors</i> ].
Dimensions.	Minimum length, five (5) feet. Minimum width, six (6) inches. Minimum thickness of tread, one and one-half (1½) inches. Minimum height of backstop, three (3) inches. Maximum height from top of rail to top of tread, twenty-four (24) inches.
Location.	One (1) under each side door.
Manner of application.	Side-door steps shall be supported by two (2) iron brackets having a minimum cross-sectional area seven-eighths (7/8) by three (3) inches or equivalent, each of which shall be securely fastened to car by not less than two (2) three-fourth (¾) inch bolts.

## LADDERS.

Number.	Four (4).
Dimensions.	Same as specified for "Box and other house cars."
Location.	Same as specified for "Box and other house cars," <i>except</i> when caboose has side doors, then side ladders shall be located not more than eight (8) inches from doors.
Manner of application.	Same as specified for "Box and other house cars."

## END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

## ROOF HANDHOLDS.

Four (4).

Same as specified for "Box and other house cars."

Number.  
Dimensions.  
Location.

One (1) over each ladder, on roof in line with and running parallel to treads of ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof

Where stiles of ladders extend twelve (12) inches or more above roof, no other roof handholds are required.

Roof handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

Manner of application.

## CUPOLA HANDHOLDS.

One (1) or more.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Number.  
Dimensions.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

One (1) continuous cupola handhold extending around top of cupola, not more than three (3) inches from edge of cupola roof.

Location.

Four (4) right-angle handholds, one (1) at each corner, not less than sixteen (16) inches in clear length from point of angle, may take the place of the one (1) continuous handhold specified, if locations coincide.

Cupola handhold shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

Manner of application.

## SIDE HANDHOLDS.

Four (4).

Same as specified for "Box and other house cars."

Number.  
Dimensions.  
Location.

Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Same as specified for "Box and other house cars."

Manner of application.

## SIDE-DOOR HANDHOLDS.

Four (4): Two (2) curved, two (2) straight.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Number.  
Dimensions.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

One (1) curved handhold, from a point at side of each door opposite ladder, not less than thirty-six (36) inches above bottom of car, curving away from door downward to a point not more than six (6) inches above bottom of car.

Location.

One (1) vertical handhold at ladder side of each door, from a point

not less than thirty-six (36) inches above bottom of car to a point not more than six (6) inches above level of bottom of door.

Manner of application.

Side-door handholds shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

#### HORIZONTAL END HANDHOLDS.

Number.

Same as specified for "Box and other house cars."

Dimensions.

Same as specified for "Box and other house cars."

Location.

Same as specified for "Box and other house cars," *except* that one (1) additional end handhold shall be on each end of cars with platform end sills as heretofore described, unless car has door in center of end. Said handhold shall be not less than twenty-four (24) inches in length, located near center of car, not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application.

Same as specified for "Box and other house cars."

#### VERTICAL END HANDHOLDS.

Same as specified for "Box and other house cars."

#### UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

### SAFETY APPLIANCES PASSENGER-TRAIN CARS.

#### PASSENGER-TRAIN CARS WITH WIDE VESTIBULES.

##### HAND BRAKES.

Number.

Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location.

Each hand brake shall be so located that it can be safely operated while car is in motion.

##### SIDE HANDHOLDS.

Number.

Eight (8).

Dimensions.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, metal.

Minimum clear length, sixteen (16) inches.

Minimum clearance, one and one-fourth ( $1\frac{1}{4}$ ), preferably one and one-half ( $1\frac{1}{2}$ ) inches.

Location.

Vertical: One (1) on each vestibule door post.

Manner of application.

Side handholds shall be securely fastened with bolts, rivets or screws.

##### END HANDHOLDS.

Number.

Four (4).

Dimensions.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

Handholds shall be flush with or project not more than one (1) inch beyond vestibule face.

Horizontal: One (1) near each side on each end, projecting downward from face of vestibule end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car. Location.

End handholds shall be securely fastened with bolts or rivets. Manner of application.

When marker sockets or brackets are located so that they can not be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

#### UNCOUPLING LEVERS.

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center line of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

#### PASSENGER-TRAIN CARS WITH OPEN END PLATFORMS.

Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon. Number.

Each hand brake shall be so located that it can be safely operated while car is in motion. Location.

#### END HANDHOLDS.

Four (4). Number.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel. Dimensions.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

Handholds shall be flush with or project not more than one (1) inch beyond face of end sill.

Horizontal: One (1) near each side of each end on face of platform end sill, projecting downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from end of end sill. Location.

End handholds shall be securely fastened with bolts or rivets. Manner of application.

#### END PLATFORM HANDHOLDS.

Four (4). [*Cars equipped with safety gates do not require end platform handholds.*] Number.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches, metal. Dimensions.

Horizontal from or near door post to a point not more than twelve (12) inches from corner of car, then approximately vertical to a point Location.

not more than six (6) inches from top of platform. Horizontal post shall be not less than twenty-four (24) inches in length nor more than forty (40) inches above platform.

Manner of application.

End-platform handholds shall be securely fastened with bolts, rivets or screws.

#### UNCOUPLING LEVERS.

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

### PASSENGER-TRAIN CARS WITHOUT END PLATFORMS.

#### HAND BRAKES.

Number.

Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location.

Each hand brake shall be so located that it can be safely operated while car is in motion.

#### SILL STEPS.

Number.

Four (4).

Dimensions.

Minimum length of tread, ten (10), preferably twelve (12), inches.

Minimum cross-sectional area, one-half ( $\frac{1}{2}$ ) by one and one-half ( $1\frac{1}{2}$ ) inches or equivalent, wrought iron or steel.

Minimum clear depth, eight (8) inches.

Location.

One (1) near each end on each side, not more than twenty-four (24) inches from corner of car to center of tread of sill step.

Outside edge of tread of step shall be not more than two (2) inches inside of face of side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application.

Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Sill steps shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

#### SIDE HANDHOLDS.

Number.

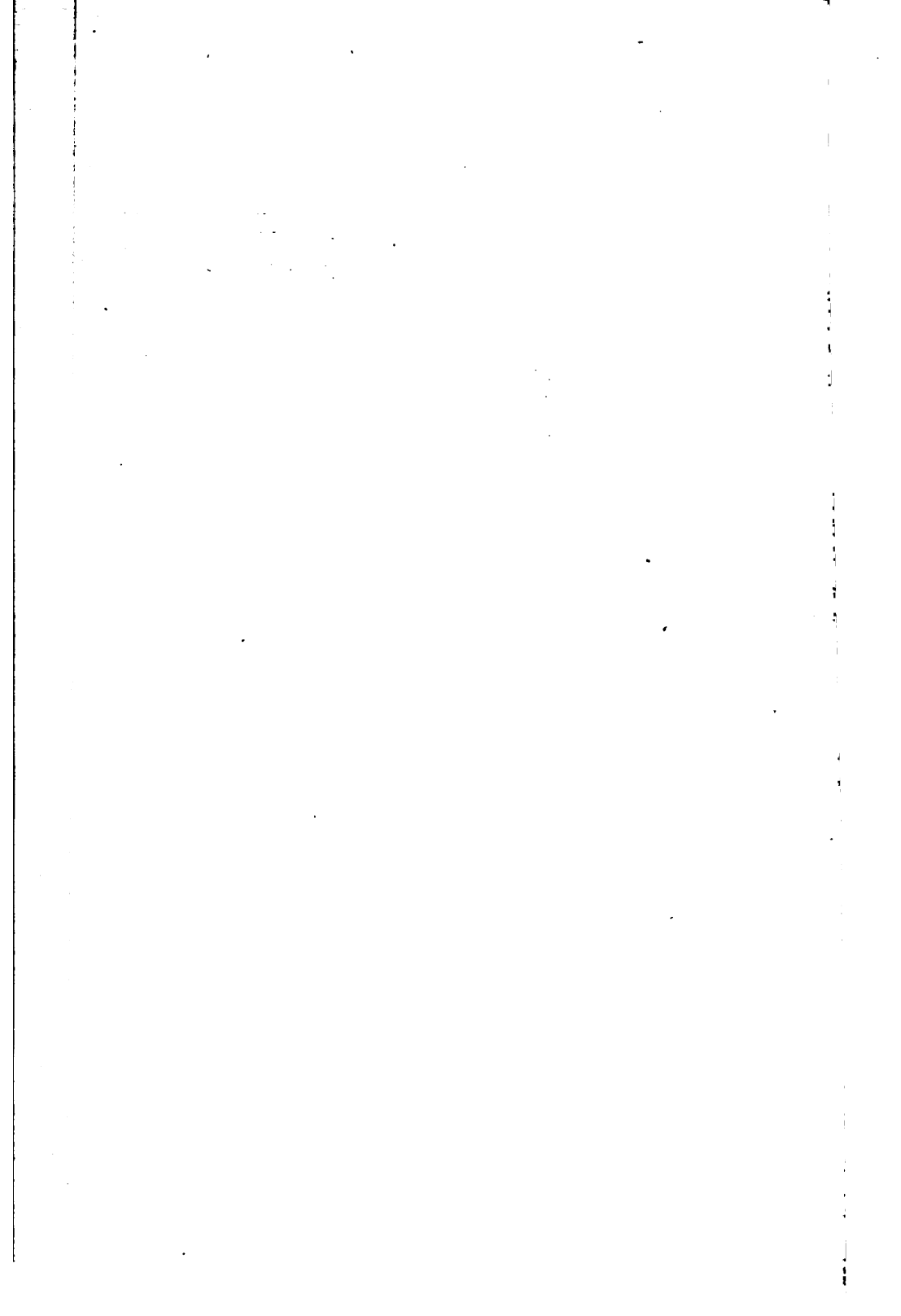
Four (4).

Dimensions.

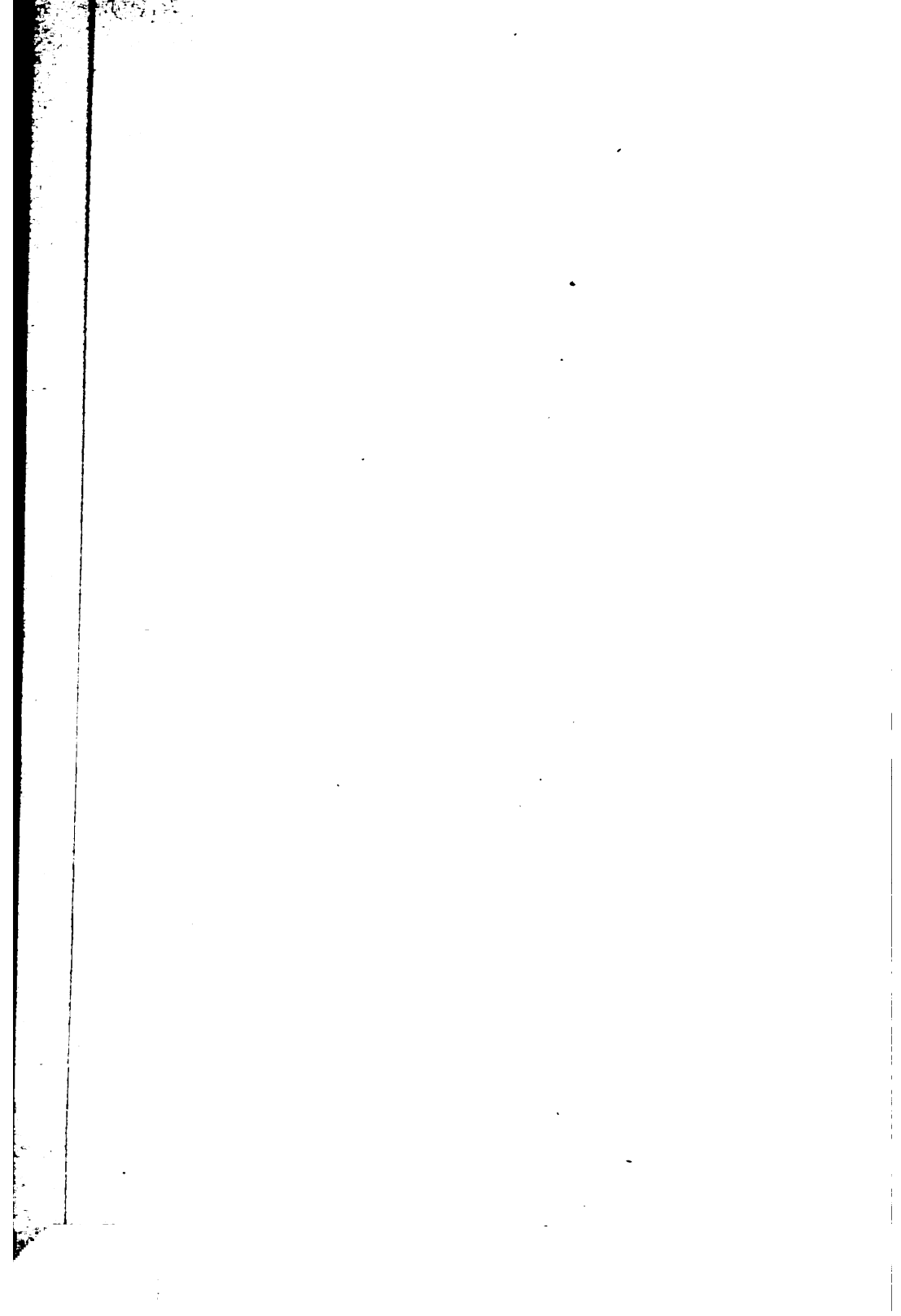
Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16), preferably twenty-four (24), inches.









Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

Horizontal or vertical: One (1) near each end on each side of car over sill step. Location.

If horizontal, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

If vertical, lower end not less than eighteen (18) nor more than twenty-four (24) inches above center line of coupler.

Side handholds shall be securely fastened with bolts, rivets or screws. Manner of application.

#### END HANDHOLDS.

Four (4).

Number.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Dimensions.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

Horizontal: One (1) near each side on each end, projecting downward from face of end sill or sheathing. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car. Location.

Handholds shall be flush with or project not more than one (1) inch beyond face of end sill. Manner of application.

End handholds shall be securely fastened with bolts or rivets.

When marker sockets or brackets are located so that they can not be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

#### END HANDRAILS.

Four (4). [*On cars with projecting end-sills.*]

Number.

Minimum diameter, five-eighths ( $\frac{5}{8}$ ) of an inch, wrought iron or steel.

Dimensions.

Minimum clearance, two (2), preferably two and one-half ( $2\frac{1}{2}$ ), inches.

One (1) on each side of each end, extending horizontally from door post or vestibule frame to a point not more than six (6) inches from corner of car, then approximately vertical to a point not more than six (6) inches from top of platform end sill; horizontal portion shall be not less than thirty (30) nor more than sixty (60) inches above platform end sill. Location.

End handrails shall be securely fastened with bolts, rivets or screws. Manner of application.

#### SIDE-DOOR STEPS.

One (1) under each door.

Number.

Minimum length of tread, ten (10), preferably twelve (12), inches.

Dimensions.

Minimum cross-sectional area, one-half ( $\frac{1}{2}$ ) by one and one-half ( $1\frac{1}{2}$ ) inches or equivalent, wrought iron or steel.

Minimum clear depth, eight (8) inches.

Outside edge of tread of step not more than two (2) inches inside of face of side of car. Location.

Manner of  
application.

Tread not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Side-door steps shall be securely fastened with not less than one-half ( $\frac{1}{2}$ ) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half ( $\frac{1}{2}$ ) inch rivets.

A vertical handhold not less than twenty-four (24) inches in clear length shall be applied above each side-door step on door post.

#### UNCOUPLING LEVERS.

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center line of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachment shall be so applied that the coupler can be operated from the left side of car.

Cars of construction not covered specifically in the foregoing sections, relative to handholds, sill steps, ladders, hand brakes and running boards, may be considered as of special construction, but shall have, as nearly as possible, the same complement of handholds, sill steps, ladders, hand brakes and running boards as are required for cars of the nearest approximate type.

"Right" or "left" refers to side of person when facing end or side of car from ground.

To provide for the usual inaccuracies of manufacturing and for wear, where sizes of metal are specified, a total variation of five (5) per cent below size given is permitted.

#### CONFERENCE RULINGS OF THE INTERSTATE COMMERCE COMMISSION.

Issued December 9, 1911.

328. November 6, 1911. Safety Appliances—Cars of Special Construction.—Locomotives while equipped with snow plows or flangers are to be regarded as cars of special construction within the meaning of the order of March 13, 1911.

329. Safety Appliances—Order of March 13, 1911, Construed.—The order entitled "United States Safety Appliance Standard," adopted on March 13, 1911, is interpreted with respect to the details mentioned as follows:

1. That gondola and ballast cars with swinging side doors at ladder locations may be considered as cars of special construction.

Ladders and handholds need not be applied to swinging side doors.

A side vertical handhold shall be placed on corner post of such cars as nearly as possible over sill step.

2. That high-side gondola and ballast cars with end platforms 18 inches or more in length may be considered as cars of special construction.

Ladders shall be placed on such cars as prescribed for high-side gondola and hopper cars, with sill step under ladder, or as near under ladder as car construction will permit. Ends and side of cars to be equipped with handholds in the same manner as flat cars.

3. Ladders—Spacing of Ladder Treads.—That the spacing of top ladder treads shall be taken from eave of roof at side of car, whether latitudinal running board is used or not. (Shown on plates illustrating United States Safety Appliance Standards, issued by the Commission July 1, 1911.)

4. Box and Other House Cars, Automobile Cars with Swinging End Doors—End Ladders:

That these cars may come under the head of cars of special construction, as per clause on page 37 of the order, and the end ladders placed as nearly as possible to designated location.

CONFERENCE RULING OF THE INTERSTATE COMMERCE COMMISSION.

Issued January 13, 1913.

Safety Appliances—Cars of Special Construction.—Order of March 13, 1911, construed:

The order entitled "United States Safety Appliance Standards," adopted on March 13, 1911, is interpreted with respect to the details mentioned, as follows:

1. High-side, drop-bottom ore cars of narrow construction are to be regarded as cars of special construction. On such cars offset sill steps may be applied where, owing to the construction of car, the standard sill step would foul the oil box and prevent the proper opening of the lid.

2. Air hose are not to be regarded as fixtures, as that word is used in that part of the order relating to "End-ladder Clearance."

CENTER PLATES.

STANDARD.

Sheet M. C. B. 20.

In 1903 the center plate shown on Sheet M. C. B. 20 was adopted as a standard.

ARCH BARS, COLUMN AND JOURNAL-BOX BOLTS FOR  
80,000-POUND CAPACITY CARS.

STANDARD.

Sheet M. C. B. 20.

In 1897 a committee on this subject reported designs which were subsequently adopted by letter ballot as Recommended Practice. Proceedings 1897, pages 188 to 192.

In 1901 these were, by letter ballot, changed from Recommended Practice to Standard. Modified 1907. They were formerly shown on Sheet M. C. B.—A, but are now shown on Sheet M. C. B. 20.

In 1907 the following changes were made:

The journal bearing centers spaced to 5 feet 6 inches, the additional four inches being added to the total length.

The spacing of bends increased to 20-inch centers, and the horizontal distance between bends increased to  $17\frac{1}{2}$  inches.

The turned up lip on the ends of tie bar was eliminated, the total length of tie bar remaining the same as arch bar, as follows: 78 inches over all.

The addition to Sheet M. C. B. 20 of the following note:

A single nut with nut-lock or cotter may be used instead of double nuts. Modified 1909.

ARCH BARS, COLUMN AND JOURNAL-BOX BOLTS FOR  
100,000-POUND CAPACITY CARS.

STANDARD.

Sheet M. C. B. 20.

In 1909 a design for arch bars, column and journal-box bolts for 100,000-pound capacity cars was adopted as standard.

PASSENGER CAR PEDESTALS.

STANDARD.

For Journals,  $3\frac{3}{4}$  by 7 inches.

Sheet M. C. B. 21.

The pedestal shown on this sheet was recommended in 1874. See Proceedings 1874, page 40; again approved as Standard in 1881; see Proceedings 1881, pages 14, 15 and 27. Also approved by the Master Mechanics' Association in the same year. Again adopted as Standard in 1893. Weight, 141 pounds.

For Journals,  $4\frac{1}{4}$  by 8 inches. Sheets M. C. B. 22.

In 1898 a Recommended Practice was adopted for passenger car pedestal for journal box with  $4\frac{1}{4}$  by 8 inch journal, and was formerly shown on Sheet M. C. B.—H. In 1901, as a result of letter ballot, this was changed to Standard, and is now shown on Sheet M. C. B. 22.

PASSENGER CAR PEDESTAL.

STANDARD.

For Journal Box, 5 by 9 inches. Sheet M. C. B. 22.

Adopted as Recommended Practice 1903. Revised 1909. Adopted Standard 1911.

## AUTOMATIC COUPLER.

STANDARD.

## Sheet M. C. B. 23.

Form adopted as standard in 1887, see pages 199-208, 243 and 253. Further details adopted in 1889 and 1893. Action of the Association in 1889 permits the use of a coupler 28 inches long instead of 30 inches as shown, for use only on cars already in service and requiring such length coupler.

In 1909 a note was added that "The dimensions from the back of butt to inside face of knuckle be  $30\frac{1}{2}$  inches."

## CONTOUR LINE AND LIMIT GAUGES FOR AUTOMATIC COUPLER.

STANDARD.

## Sheets M. C. B. 23 and 24.

Standard contour line was announced by Executive Committee under instructions from the Association, April 8, 1888. Limit gauges for preserving standard contour line adopted in 1891.

These gauges, properly proven by master gauges, may be procured from Pratt & Whitney Company, of Hartford, Conn. A duplicate set of master gauges is held in the office of the Secretary for reference when desired.

In 1899 the contour lines showing the length of the guard arm were extended about 1 inch.

In 1899 the M. C. B. standard limit gauge for new couplers was changed by moving the screw to a new position.

In 1902 the contour gauge was strengthened by the use of a solid web in the weak part of the frame, and part of the outside flange increased to  $\frac{1}{4}$  inch in thickness. The handhold was also reduced in size to give greater strength.

In 1903 the contour line of the M. C. B. coupler was changed as now shown on Sheet M. C. B. 23.

In 1904 the coupler and knuckle limit gauges were changed to conform to the contour lines adopted in 1903 and to have raised figures "1904" cast on them. See Letter Ballot, Proceedings, 1904.

## COUPLER HEAD.

STANDARD.

In 1899 the recommendation of the Coupler Committee that the horizontal plane containing the axis of the shank of the coupler bisect the vertical dimensions of the knuckle and end of guard arm was adopted as a standard of the Association.

In 1908 the following note was added to Sheet M. C. B. 11:

That all new types of couplers put on the market after January 1, 1909, have a dimension of  $9\frac{1}{4}$  inches from back of coupler horn to inside face of knuckle, and that the face or front wall of coupler have a minimum thickness of  $1\frac{1}{4}$  inches.

**TEMPORARY STANDARD COUPLER — HEAD.****STANDARD.**

In 1911, by special letter ballot, the length of coupler head from back of striking horn to coupling face of closed knuckle was fixed at  $12\frac{1}{4}$  inches for the M. C. B. Temporary Standard Coupler for existing cars.

**GUARD ARM.****STANDARD.**

In 1899 the vertical dimensions of the end of guard arm was fixed at  $7\frac{1}{2}$  inches as a minimum.

**STRIKING HORN.****STANDARD.**

In 1899 the vertical height of the stop shoulder, or horn of coupler, was fixed at not less than  $3\frac{1}{2}$  inches.

In 1899 the recommendation of the Coupler Committee that the horn of the coupler be arranged to touch the striking plate before the back of the head of the coupler strikes the ends of the draft timbers, was adopted as a standard of the Association.

**KNUCKLE.****STANDARD.**

In 1899 the vertical dimension of the knuckle was fixed at 9 inches as a minimum.

In 1903 the solid knuckle was adopted as a standard of the Association to be used for all repairs and in all new couplers after January 1, 1904.

In 1907 a limiting dimension of not more than 1 inch was shown for the diameter of core hole in lug of knuckle to prevent a recurrence of the slotted knuckle weakness.

**KNUCKLE THROW.****STANDARD.**

In 1905 the following Recommended Practice was adopted: "That the use of a knuckle-throwing device which will throw the knuckle completely open and operate under all conditions of wear is favored by the Association. Advanced to Standard in 1910.

**KNUCKLE PIVOT PIN.****STANDARD.**

In 1899 the sizes of pivot pins were fixed as follows:

$1\frac{1}{2}$  inches or  $1\frac{5}{8}$  inches in diameter and  $13\frac{1}{2}$  inches from the under side of head to center of pin hole for  $\frac{3}{8}$ -inch cotter.

In 1904, as a result of the letter ballot, the note in the lower left-hand corner of Sheet M. C. B. 11, relating to pivot pins, was changed to read as follows:

"Pivot pin must be of steel,  $1\frac{5}{8}$  inches in diameter, of sufficient length to permit applying a  $\frac{3}{8}$ -inch cotter pin below the coupling lug."

**LOCK LIFT.****STANDARD.**

In 1905 a recommendation was adopted that the knuckle lock lift be in the central longitudinal vertical plane of the coupler, located between the striking horn and contour lines and operate from the top by an upward movement. Advanced to Standard in 1907.

In 1908 the following notes were added to Sheet M. C. B. 11:

That the total lift of locking pin be not more than 6 inches.

That all couplers must have a  $1\frac{1}{8}$ -inch eyelet for locking device located immediately above locking pin hole.

In 1912, by letter ballot, the underneath uncoupling arrangement was adopted as an alternate standard of the Association.

**LOCK SET.****STANDARD.**

In 1903 a recommendation was made that for new equipment purchased after January 1, 1904, only such couplers as have a lock set on or within the head and which do not depend upon the uncoupling lever to hold up the lock should be specified. By letter ballot this was adopted as a Standard.

**COUPLER SHANK.****STANDARD.**

In 1901 a design of shank 5 by 7 inches back of the head was adopted as Standard.

In 1905 an additional dimension "Not less than  $20\frac{3}{4}$  inches" was added to plan view of 5 by 7 inch coupler to definitely locate the point at which shank shall measure 7 inches. Also the note, "Tail end for Continuous Draft," under the drawing of slotted-tail coupler, was omitted as being unsuited for present approved practice.

In 1907 a note was added to the effect that there should be no projections on the bottom of the shank from the line of the horn back for 12 inches, to provide for proper movement of shank on carrier iron.

In 1911 the clear surface without projection on bottom of coupler shank was increased  $\frac{1}{2}$  inch forward toward head of coupler.

**COUPLER BUTT.****STANDARD.**

In 1905 a butt 5 by  $5\frac{1}{2}$  by  $9\frac{1}{8}$  inches for friction draft gear was adopted as Recommended Practice. Advanced to Standard in 1907.

In 1907 the back wall of butt was changed to  $\frac{3}{4}$  inch thick, owing to the fact that the tail pin had fallen into disuse.

The width of butt was changed to 5 inches on both sizes of coupler shanks to properly provide for securing yokes.

A dimension of not less than  $1\frac{1}{4}$  inches was shown for the yoke gib shoulder of the  $9\frac{1}{8}$ -inch butt to provide for the increased length of gib.

In 1909 a radius of  $\frac{3}{16}$  inch on the yoke gib shoulder of coupler butt was adopted.

**KEY SLOT.****STANDARD.**

In 1910 the key-slot dimensions in the coupler butt were modified, making it available for use on all standard sizes of coupler butts.

In 1910 a recommendation was adopted that coupler manufacturers use a key 5 by  $1\frac{1}{8}$  inches as a gauge in order to secure correctness and uniformity in the size of the key slot.

In 1911 design of key slot in coupler shank was changed.

**YOKE RIVETS.****STANDARD.**

In 1905 the use of  $1\frac{1}{4}$ -inch rivets for attaching yokes to coupler butts was adopted as Recommended Practice. Advanced to Standard in 1908.

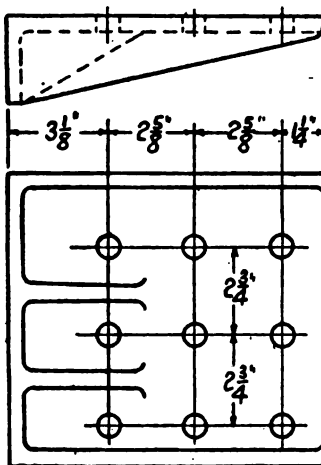
In 1908 the diameter of rivet holes in coupler butts was changed from  $1\frac{3}{16}$  inches to  $1\frac{5}{16}$  inches.

**SPACING BETWEEN CENTER SILLS.****STANDARD.**

In 1905, that the spacing between steel center sills be  $12\frac{7}{8}$  inches was adopted as Recommended Practice. Advanced to Standard in 1907.

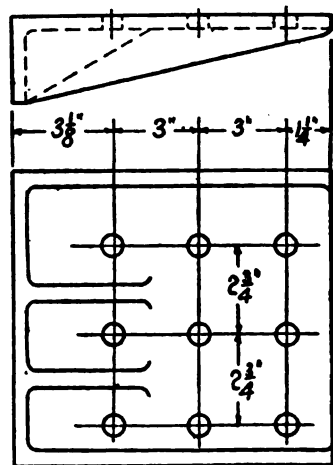
**FRONT AND BACK STOP.****STANDARD.**

In 1905, that front and back stops with rivet holes  $1\frac{5}{16}$  inch in diameter be spaced, as shown below, were adopted as Recommended Practice. Advanced to Standard in 1907.



*Holes cored  $\frac{15}{16}$ "*

**Drawing A.**



*Holes cored  $\frac{15}{16}$ "*

**Drawing B.**

**SPACING BETWEEN COUPLER HORN AND BUFFER BEAM.****STANDARD.**

In 1905, that the spacing between coupler horn and buffer beam be  $1\frac{3}{4}$  inches for all spring gear, and  $2\frac{3}{4}$  inches for all friction gear, was adopted as Recommended Practice. Advanced to Standard in 1907.

**FOLLOWERS.****STANDARD.**

In 1905, that flat followers be made of wrought iron or open-hearth steel  $1\frac{5}{8}$  inches thick for tandem spring gear and  $2\frac{3}{4}$  inches thick for twin spring and friction gear was adopted as Recommended Practice. Advanced to Standard in 1907.

**SIDE CLEARANCE OF COUPLERS.****STANDARD.**

In 1889 the Association decided that the opening in carrier iron, where coupler enters, should be  $5\frac{3}{4}$  inches vertically and  $5\frac{1}{2}$  inches horizontally.

Drawing revised in 1896.

The revision made in 1896 consisted in the elimination of the carrier iron from Sheet M. C. B. 11. Text, 1896 to 1911. Proceedings shows this as M. C. B. Sheet B. Should be M. C. B. Sheet 11, as per page 472, 1896 Proceedings.

In 1899 the play of the shank of the coupler in the carry arm was changed to not less than  $\frac{1}{2}$  inch on each side.

In 1905 the total coupler side clearance was increased to  $2\frac{1}{2}$  inches.

In 1907 was modified to read: "That the total side clearance of the coupler be not less than  $2\frac{1}{2}$  inches," and adopted as Standard. In 1909 was modified to read: "Total side clearance of coupler to be  $2\frac{1}{2}$  inches."

**AREA OF LOCK-BEARING SURFACE ON TAIL OF  
COUPLER KNUCKLE.****RECOMMENDED PRACTICE.**

In 1910 a Recommended Practice was adopted that the minimum effective area of lock-bearing surface on knuckle tail shall not be less than 4 square inches.

**AREA OF BEARING SURFACE OF LOCK ON COUPLER  
WALL.****RECOMMENDED PRACTICE.**

In 1910 a Recommended Practice was adopted that the effective area of bearing surface between the lock block and coupler wall shall be equal to or greater than the effective area of lock-block bearing on knuckle tail.

## COUPLER YOKES.

STANDARD.

## Sheet M. C. B. 23-A.

In 1905 coupler yokes were adopted as Recommended Practice.

In 1907 the opening between the gibs of the yoke for 9½-inch butt coupler was made 6¾ inches instead of 7¾ inches in order to increase the bearing of the present yoke on the coupler butt.

In 1909 a ⅛-inch radius was added to the inside of yoke lip. Advanced to Standard 1911.

## GAUGES FOR COUPLER AND YOKE.

STANDARD.

## Sheet M. C. B. 24.

In 1909 gauges to insure proper fitting were adopted for both the coupler and yoke. They are shown on Sheet M. C. B. 24. Gauge No. 1 is used on 6½-inch butt couplers to gauge rivet holes and lug for yoke fitting, also length and height of butt. Gauge No. 2 is used on 9½-inch butt couplers. Gauge No. 3 gauges the width and height of shank and width of butt on both 5 by 5 and 5 by 7 shank couplers. Gauge No. 4 gauges the length of shank from back of striking horn to back of butt on both 5 by 5 and 5 by 7 shank couplers. Gauge No. 5 gauges the rivet holes and the lips on all yokes.

## GAUGE FOR WORN COUPLERS.

STANDARD.

## Sheet M. C. B. 16.

In 1899 the Coupler Committee recommended a form of gauge to define the contour lines more fully when worn. This gauge was adopted as Recommended Practice.

In 1904 the Committee on M. C. B. Couplers recommended a modification of the wheel defect gauge, which would make a more satisfactory worn limit coupler gauge, which was adopted by letter ballot. See Proceedings, 1904; also Sheet A. Modified and adopted as Standard in 1905. Modified 1907.

## SPECIFICATIONS FOR M. C. B. AUTOMATIC COUPLERS.

STANDARD.

In 1899 specifications and tests for M. C. B. automatic couplers were adopted as Recommended Practice. In 1903 they were revised.

In 1905 they were revised and adopted as a Standard. Revised 1909.

In 1911 the word "Coupler" was defined to include the bar and contained parts within the head.

In 1911 the manufacturer's mark was required on the head of the knuckle pivot pin.

In 1912 the specifications were changed to permit of an underneath unlocking device operating with an upward movement.

In 1913 the guard-arm test was readopted as a Standard in place of the face test and specifications revised as to form only, as follows:

#### SPECIFICATIONS.

1. The couplers will be subject to the inspection and test of the ..... Railroad Company as to their workings, general condition and strength.

2. PLACE OF INSPECTION AND TEST.—The test and inspection will be made at the place of manufacture.

3. HELP.—All necessary assistance and labor for making inspection, tests and prompt shipment shall be furnished by the manufacturer free of charge.

4. ORDERING.—Couplers shall be ordered as far as practicable in lots of 1,000.

5. For each 1,000 ordered, the manufacturer shall furnish 1,013 and 6 additional knuckle pivot pins, and in the event of additional couplers or knuckle pivot pins being required to carry out the tests, they shall be furnished free of cost by the manufacturer.

6. DEFINITIONS.—The word "Coupler" as here used includes the bar itself and the contained parts within the head, such as locks, knuckle throws, etc.

#### I. MANUFACTURE.

7. MANUFACTURE.—The couplers furnished under these specifications shall be made of steel in accordance with the best foundry methods and shall not be painted.

9. ANNEALING.—All parts shall be well annealed throughout.

10. DROP-TEST MACHINE.—The testing machine approved by the Master Car Builders' Association shall be used for the testing of couplers. For drop-testing machine and details, see Sheets M. C. B. 29, 29-A, 29-B, 29-D and 29-E.

11. TEST NO. 1, STRIKING TEST ON CLOSED KNUCKLE OF COMPLETED COUPLER, TAKING SAMPLE FOR TEST NO. 1.—After the inspection by the manufacturer and the ..... railroad inspector, as per sections 38 and 40, the latter shall select one complete coupler, taken at random, from each of the lots as provided for in section 39 and subject them to the following test:

12. PREPARATION FOR TEST NO. 1.—As a preliminary, the coupler shall be marked on the bottom of butt with a center-punch line, parallel to the axis of the shank, this line to extend to the inner face of the knuckle (see Fig. 1). The coupler shall be rigidly fixed in the machine in a vertical position, with the axis of the coupler in the center line of drop, the pivot pin hole parallel to line through center of legs of machine and the butt blocked solidly on the anvil to prevent lateral motion, by means of steel fillers and wedges, the latter sledged down tight, this sledging repeated after each blow. The heights of support from bottom of butt end should not be greater than  $19\frac{1}{2}$  in.

13. **STRIKING TEST.**—Blows to be struck directly on knuckle.

3 blows of 1,640 lbs. falling 5 feet.

3 blows of 1,640 lbs. falling 10 feet.

14. **FAILURE OF TEST NO. 1.**—The coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 5 feet and three blows at 10 feet, or if any crack appears more than 1 inch long or open more than  $\frac{1}{8}$  inch or the center-punch line measured at the contour is distorted more than  $1\frac{1}{4}$  inches after having received three blows at 10 feet, or if the knuckle is closed more than  $\frac{3}{4}$  inch from its original position, when pulled out against the lock by hand after receiving three blows at 5 feet, or if the knuckle will not open, or if the locking device is inoperative after test. For measuring axial distortion and knuckle closure see Figs. 1 and 2.

15. **RETEST.**—If the coupler fails to stand the prescribed tests, but, before failing, stands three blows at 5 feet and 1 blow at 10 feet, a retest will be admissible, and a second coupler shall be taken from the same lot from which the first coupler was taken and tested as per section 11. If it stands the test, that lot of couplers shall be accepted as far as test No. 1 is concerned; otherwise that lot of couplers shall be rejected and another lot substituted and tested in the same way.

16. **TAKING SAMPLES FOR TESTS NOS. 2, 3 AND 4.**—From each 1,003 couplers accepted by test No. 1, three complete couplers shall be selected by the inspector, one of which shall be subjected to test No. 2, one to test No. 3 and one to test No. 4 hereafter specified.

17. **RETEST FOR TESTS NOS. 2, 3 AND 4.**—If any coupler fails to stand the prescribed test, but before failing stands a sufficient number of blows to make a retest admissible, a second coupler shall be taken from the same lot or lots from which the first was taken. For instance, if the coupler selected for test No. 3 has been taken from the fourth 100 couplers and the failure allows a retest, a second coupler shall be taken from the fourth 100 couplers. If it stands the test, that lot of 1,000 couplers shall be accepted as far as that test is concerned, otherwise that lot shall be rejected and another lot of 1,000 couplers substituted.

18. **TEST NO. 2, GUARD-ARM TEST OF DRAWBAR.**—As a preliminary, pivot pin, knuckle and locking device having been removed, the coupler must be marked on bottom with a center-punched line (see points 1, 2 and 3 in Figs. 3 and 4) parallel to axis of shank and extending to the contour face; a center-punched mark must also be placed at the end of guard arm and on lug (see Fig. 3). The coupler must be blocked rigidly in a vertical position in the machine with steel fillers and wedges, the latter sledged down tight and the sledging repeated after each blow. The butt must rest solidly on the anvil and must be blocked to prevent lateral motion. The edge of guard arm must be on line through centers of legs of machine.

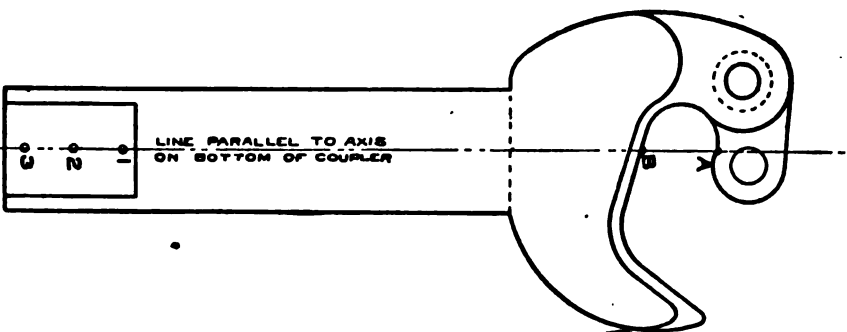


FIG. 1.

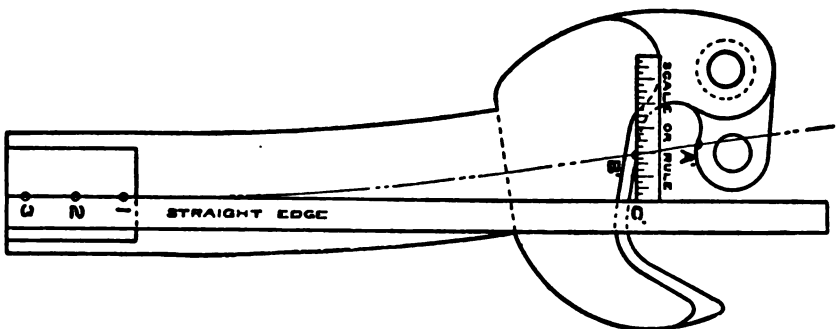


FIG. 2.

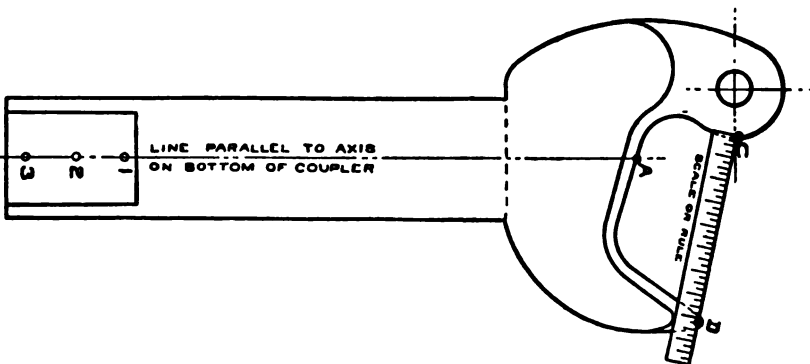


FIG. 3.

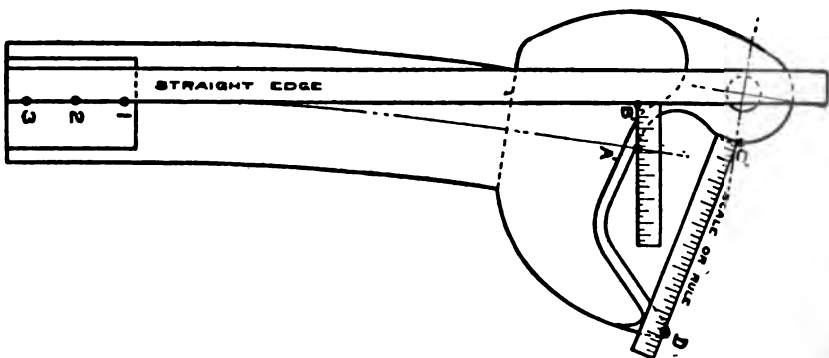


FIG. 4.

# BEFORE TEST

# AFTER TEST

# BEFORE TEST

# AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO. 1  
 OF C MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED  $\frac{1}{8}$ "  
 OF C MEASURES ANGULAR CLOSE AND MUST NOT EXCEED  $\frac{1}{4}$ "

METHOD OF MEASURING DEFLECTION IN TEST NO. 2  
 OF C MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED  $\frac{1}{8}$ " FOR  
 COUPLERS WITH 3" SHAFT ON  $\frac{1}{8}$ " FOR COUPLERS WITH 2" SHAFT ON  
 OF C MEASURES ANGULAR CLOSE AND MUST NOT EXCEED  $\frac{1}{4}$ "

19. FACE TEST.—Blows to be struck directly on guard arm.

Three blows of 1,640 pounds falling 3 feet.

Four blows of 1,640 pounds falling 5 feet.

20. The coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and four blows at 5 feet, or if any crack appears more than 1 inch long or open more than  $\frac{1}{8}$  inch or if the center-punched line is distorted more than  $1\frac{1}{2}$  inches for 5 by 7 inch shank, or  $1\frac{3}{4}$  inches for 5 by 5 inch shank couplers, or if the distance between center-punch marks on bottom of head has widened more than  $\frac{1}{8}$  inch. For method of measuring axial and guard-arm deflection, see Figs. 3 and 4. Should the bar before failing stand three blows at 3 feet and two blows at 5 feet, another coupler shall be provided and tested as per Section 2, under "Inspection" governing retest.

21. TEST No. 3, JERK TEST OF COMPLETE COUPLERS, PREPARATION.—

One coupler shall be placed in an inverted position in the yoke forging of test machine and equalizer bar placed so as to rest level, one end in the closed knuckle, the other resting central on the spring follower cap.

22. JERK TEST.—The weight shall strike the equalizer bar midway between the center line of coupler and the center line of the spring follower cap.

3 blows of 1,640 lbs. falling 5 feet.

3 blows of 1,640 lbs. falling 10 feet.

23. FAILURE OF TEST No. 3.—A coupler shall be considered as having failed to stand this test if it is broken before it has received three blows at 5 feet and three blows at 10 feet, or if any crack appears more than 1 inch long or open more than  $\frac{1}{8}$  inch or if the knuckle is open more than  $\frac{3}{4}$  inch from its original position after the third blow at 10 feet, or if the equalizer bar will not stay in place when struck, or if the knuckle will not open or if the locking device is inoperative after receiving the full test. Should the coupler fail to stand the prescribed test, but stand three blows at 5 feet and one blow at 10 feet, another complete coupler shall be provided and tested as per section 15 governing retest.

24. TEST No. 4, PULLING TEST OF COMPLETE COUPLER.—One complete coupler shall be supported in the machine by yoke forging and locked as in a running position to a dummy, the axes of the coupler and dummy to be in the same straight line. The dummy shall have the contour lines of an M. C. B. coupler, with the exception of the guard arm, which may be omitted. The coupler shall stand a steady pull of 150,000 pounds.

25. FAILURE OF TEST No. 4.—A coupler shall be considered as having failed to stand this test if it is broken before it has been pulled the prescribed number of pounds, or if any cracks appear more than 1 inch long or open more than  $\frac{1}{8}$  inch or if the knuckle has opened more than  $\frac{5}{8}$  inch from the original position, when pulled out against the lock, or if

it slips apart from the dummy in the machine, or if the knuckle will not open, or if the locking device is inoperative after test. Should the coupler fail to stand the prescribed test, but before failing stand a pull of 100,000 pounds, another complete coupler shall be provided and tested as per section 15 governing retest. The measurement of the knuckle opening shall be obtained after the pressure is released.

26. **FAILURE OF PARTS.**—The final failure of any part to meet test shall not condemn the complete coupler, but only that part which fails, and such part in all couplers presented shall be replaced, after which the test shall proceed, using new couplers, as if no part of the test had been made.

(a) **NOTE.**—Any part of any coupler which has been subjected to test is condemned for service.

27. **TEST OF PIVOT PINS.**—If the lot of 1,000 couplers is accepted on test No. 1, the inspector shall take at random from the accepted couplers five pivot pins, and from the extra six pivot pins one, making a total of six, which shall be subjected to the requirements of the specifications for knuckle pivot pins. If these pins pass the required inspection and test, the couplers complete may be accepted.

28. **FAILURE OF PINS.**—If the pins do not pass the inspection and tests prescribed in the specifications for knuckle pivot pins, the manufacturer will be required to present a new lot of 1,000 pivot pins, which shall be treated in accordance with the requirements of the specifications for knuckle pivot pins. If these are accepted, then the manufacturer will be required to remove all the former lots of pins in the couplers otherwise acceptable and substitute the lot of pins which has been accepted.

### III. DIMENSIONS AND GAUGES.

29. **DIMENSIONS.**—Couplers must conform to M. C. B. standard drawings and contour lines, and the dimensions of butt and shank shall be within the limits of variations shown by M. C. B. standard drawings.

30. **GAUGES.**—Standard M. C. B. gauges shall be used in gauging all parts for which gauges are provided.

### IV. WORKMANSHIP AND FINISH.

31. **WORKMANSHIP.**—Bars, knuckles, locking pins or blocks and knuckle pivot pins shall be accurately made to gauges furnished by the manufacturer. These gauges shall govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability and freedom of motion between the assembled parts without further adjustment or machining. Bars and knuckles shall not be accepted if distorted by improperly matched flasks or by any other defects due to molding.

32. **FINISH.**—They shall be free from injurious shrinkage cracks, flaws, checks, and sand holes or blow holes.

33. **HOLES, DRILLED OR CORED.**—The holes for pivot pins in lugs of bars and knuckles may be drilled, or if cored shall be broached out, and

shall not be more than  $\frac{1}{2}$  inch larger than pin, and rivet holes in butt shall be drilled, or if cored, shall be broached out. The holes shall be parallel to the face of the bar or knuckle and at right angles to the axis of the bar or knuckle.

34. **FACES.**—The pulling and contact faces of couplers and knuckles shall be clean, smooth, and at right angles to axis of bar.

#### V. MARKING.

35. **MARKING.**—The name of coupler shall be legibly cast on the top side of head of the bar. The knuckle shall also bear the name of the coupler and the manufacturer's name or identification mark legibly cast or stamped at some point where it will not be worn off. Knuckle pins shall bear the manufacturer's mark on the head of pin.

36. **M. C. B. MARKING.**—Every coupler and knuckle made to comply with these specifications shall have a slightly raised plate or flat surface cast upon the head in plain view, where it will not be subject to wear. After a lot of complete couplers have successfully passed inspection and tests herein required, the letters M. C. B. shall be legibly stamped upon the plate at each coupler and knuckle, this mark to be evidence that the complete coupler is an M. C. B. Standard.

37. **SERIAL NUMBER.**—Each knuckle and drawbar shall bear the serial number legibly stamped or cast on it.

#### VI. INSPECTION AND GROUPING.

38. **MANUFACTURER'S INSPECTION.**—The couplers shall be thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, etc., herein specified.

39. **GROUPING.**—Couplers shall then be arranged in lots of 101 and 102 so as to provide for the necessary 1,013 couplers specified in section 4. Where possible, care should be taken to put all couplers of the same melt number or numbers in the same lot or lots.

40. **PURCHASER'S INSPECTION.**—The inspector shall then inspect and gauge each coupler as to its compliance with drawing sizes and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces shall be ground or chipped off before the couplers are accepted.

#### VII. MECHANISM.

41. **OPERATING PARTS.**—Couplers shall have a lock set within the head of the coupler. They shall be so designed as not to part when the knuckle pin is broken or removed. They shall couple or uncouple with each other (with either or both knuckles open) and also with the master or sample coupler. They should lock easily when the knuckle is pushed in with the hand. They shall have steel pivot pins  $1\frac{5}{8}$  in. in diameter of sufficient length to permit applying a  $\frac{3}{8}$ -inch cotter pin through the pin

below the coupler lug and in every way conforming to the requirements as stated in the specifications for knuckle pivot pins.

42. **LOCK LIFT.**—The lock lift shall be in the central longitudinal vertical plane of the coupler, located between the vertical plane of the striking horn and contour lines, and shall operate either from the top or bottom by an upward movement. The total lift of locking pin shall not be more than 6 inches.

#### SPECIFICATIONS FOR KNUCKLE PIVOT PINS.

#### STANDARD.

In 1907 the following specifications were adopted as Recommended Practice and made Standard in 1909. Revised as to form in 1913.

1. The knuckle pivot pins will be subject to the inspection and tests of the ..... Railroad Company for general condition and strength.

2. **PLACE OF INSPECTION AND TEST.**—The inspection and test will preferably be made at the place of manufacture.

3. **HELP.**—All necessary assistance and labor for making inspection, tests and prompt shipment, shall be furnished by the manufacturer free of charge

4. **ORDERING.**—Knuckle pivot pins shall be ordered as far as practicable in lots of 500.

The manufacturer shall furnish three extra pins with each order of 500 pins, and in the event of additional pins being required to carry out the prescribed tests they shall be furnished free of cost by the manufacturer.

#### I. MANUFACTURE.

5. **PROCESS.**—All knuckle pivot pins ordered under these specifications shall be made from open-hearth steel, properly forged and then annealed and shall not be painted.

#### II. PHYSICAL PROPERTIES AND TESTS.

6. **DROP-TEST MACHINE.**—The testing machine approved by the Master Car Builders' Association shall be used in the test of knuckle pivot pins.

7. **SAMPLING.**—From each lot of 503 pins, the inspector shall select three pins taken at random and subject them to the cross-bending drop test as hereinafter specified.

8. **CROSS-BENDING TEST.**—The cross-bending test will be made in a standard M. C. B. drop-testing machine. The pins resting on rounded supports held rigidly 10 in. center to center to be subjected to a blow by the standard weight of 1,640 lbs. falling at a height of 3 feet. The blow of the weight should be transmitted to the specimen by a block having a round lower edge resting on the specimen. The radius of all these round edges is to be  $\frac{3}{4}$  in. All pins are to be tested cold and shall not show any cracks or fractures. The bend shall be directly under the nose of the plunger.

9. **FAILURE.**— Pins will be rejected if they crack, break or show a deflection less than 15 degrees or greater than 35 degrees.

10. **RETEST.**— If one of the pins fails to stand the test herein required and the other two pass, three more pins shall be selected at random from the same lot from which the first pins were taken. If all three of these pins stand the prescribed tests, that lot of pins will be accepted, otherwise that lot of pins shall be rejected and another lot substituted and tested in same way.

### III. DIMENSIONS AND GAUGES.

11. **PERMISSIBLE VARIATIONS.**— All pins shall not be more than  $1\frac{1}{4}$  in. nor less than  $1\frac{3}{4}$  in. in diameter determined by a suitable gauge and shall not vary more than  $\frac{1}{8}$  in. above or below the proper length.

### IV. WORKMANSHIP AND FINISH.

12. **WORKMANSHIP.**— The head shall be well formed and the pins which are not straight and true, and those which have blisters or surface defects of any kind, will be rejected.

13. **FINISH.**— The lower end of the pin shall be cut off square and have at least  $\frac{1}{4}$  in. bevel or chamfer. The cotter-pin hole to be properly drilled for  $\frac{3}{8}$ -in. cotter.

### V. MARKING.

14. **MARKING.**— Pivot pins shall have the manufacturer's marks on the head of the pin.

### VI. INSPECTION AND REJECTION.

15. **MANUFACTURER'S INSPECTION.**— Knuckle pivot pins shall be thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness, dimensions of parts, etc., herein specified.

16. **GROUPING.**— Knuckle pivot pins shall then be arranged in lots of 503, and, where possible, care should be taken to put all pins of the same melt number or numbers in the same lot or lots.

17. **PURCHASER'S INSPECTION.**— The inspector shall then inspect and gauge each knuckle pivot pin as to its compliance with drawing sizes and for surface defects.

### SPECIFICATIONS FOR SEPARATE KNUCKLES.

### STANDARD.

In 1904 the following specifications were adopted as Recommended Practice for separate knuckles and in 1907 advanced to Standard. Revised as to form in 1913.

1. Knuckles will be subject to the inspection and tests of the ..... Railroad Company as to their general condition and strength.

2. **PLACE OF INSPECTION AND TEST.**— The tests and inspection will be made at the place of manufacture.

3. **HELP.**—All necessary assistance and labor for making inspection, tests and prompt shipment shall be furnished free by the manufacturer.

4. **ORDERING.**—Knuckles will be ordered as far as is practicable in lots of 100 each.

For each 100 knuckles ordered the manufacturer shall furnish 102, and in the event of additional knuckles being required to carry out tests, they shall be furnished free of cost by the manufacturer.

#### I. MANUFACTURE.

5. **MANUFACTURE.**—The knuckles furnished under these specifications shall be made of steel in accordance with the best foundry methods and shall not be painted.

6. **ANNEALING.**—All parts shall be well annealed throughout.

7. **NUMBER CAST IN ONE MELT.**—As many knuckles as possible shall be cast from the same melt.

#### II. PHYSICAL PROPERTIES AND TESTS.

8. **DROP-TEST MACHINE.**—The testing machine approved by the Master Car Builders' Association shall be used in the test of knuckles.

9. **SAMPLING.**—From each lot of 102 knuckles the inspector shall select two knuckles at random from lot or lots and subject one to test No. 1 and the other to test No. 2.

10. **TEST NO. 1 — STRIKING TEST — PREPARATION.**—The striking test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the holes in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and the knuckle supports and between the knuckle supports and the housing. The striking block is then placed in the housing casting resting upon the knuckle. A fitting piece made to suit the type of knuckle is slipped into position between the tail and housing casting so that the striking face of the knuckle is in a horizontal position.

11. **STRIKING TEST.**—Blows to be struck on striking block, through which they are transmitted to knuckle.

3 blows of 1,640 lbs. falling 4 feet.

3 blows of 1,640 lbs. falling 8 feet.

12. **FAILURE OF TEST NO. 1.**—The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 4 feet and three blows at 8 feet, or if any crack appears more than 1 inch long or open more than  $\frac{1}{8}$  inch.

13. **RETEST.**—If this knuckle fails to stand test No. 1, but before failing stands three blows at 4 feet and one blow at 8 feet, a retest will be admissible and another knuckle shall be taken from the same lot and tested as per section 9.

14. **JERK TEST—PREPARATION.**—The jerk test back block and knuckle supports are placed in the housing against the back and sides, the knuckle dropped in between the supports and held by inserting the pin through the hole in the knuckle supports. The knuckle is then adjusted by means of liners between the back block and knuckle supports and between the knuckle supports and the housing. The striking block is then inserted, resting on the inner face of the knuckle, and a block of suitable size inserted between the tail of the knuckle and striking block so that the striking face of the knuckle is in a horizontal position.

15. **NOTE.**—If preferred by manufacturers, an old coupler and lock of the same kind in which the knuckle fits properly and which may be suitably reinforced in order to endure as many tests as possible may be used in place of supporting casting for this test.

16. **JERK TEST.**—Blows to be struck on the striking block, through which they are transmitted to the knuckle.

3 blows of 1,640 lbs. falling 3 feet.

2 blows of 1,640 lbs. falling 6 feet.

17. **FAILURE TEST No. 2.**—The knuckle shall be considered as having failed to stand this test if it is broken before it has received three blows at 3 feet and two blows at 6 feet, or if any crack appears more than 1 inch long or open more than  $\frac{1}{16}$  inch.

18. **RETEST.**—If this knuckle fails to stand test No. 2, but before failing stands three blows at 3 feet, a retest will then be admissible, and another knuckle will be taken from the same lot and tested as per section 14.

### III. DIMENSIONS AND GAUGES.

19. **DIMENSIONS.**—All dimensions shall be within the limits of variations shown by M. C. B. Standard drawings.

20. **GAUGES.**—Standard M. C. B. gauges shall be used in gauging all parts for which gauges are provided.

### IV. WORKMANSHIP AND FINISH.

21. **WORKMANSHIP.**—Knuckles shall be accurately made to gauges furnished by the manufacturer. These gauges shall govern all dimensions representing fitting surfaces, thereby insuring absolute interchangeability without machining. Knuckles shall not be accepted if distorted by improperly matched flasks or by any other defects due to molding.

22. **FINISH.**—They shall be free from injurious shrinkage cracks, flaws, checks and sand holes or blow holes.

23. **HOLES, DRILLED OR CORED.**—The holes for pivot pins in knuckles should be drilled, or if cored shall be broached out, and shall not be more than  $\frac{3}{4}$  in. larger than 1 $\frac{5}{8}$ -in. diameter pivot pins. The holes shall be parallel to the face of the knuckle and at right angles to the axis of the knuckle.

24. **FACES.**—The pulling and contact faces of knuckles shall be clean and smooth.

#### V. MARKING.

25. **MARKING.**—Each knuckle shall bear the name of the coupler, a serial number and the name of the manufacturer or identification marks legibly cast at some point where it will not be subject to wear.

26. **M. C. B. MARKING.**—Each knuckle made to comply with these specifications shall have a raised plate or flat surface cast upon the head in plain view where it will not be subject to wear. After a lot of knuckles have successfully passed the inspection and tests prescribed herein, the letters M. C. B. shall be legibly stamped upon the plate on each knuckle, this mark to be evidence that the knuckle is an M. C. B. Standard.

#### VI. INSPECTION AND GROUPING.

27. **MANUFACTURER'S INSPECTION.**—The knuckles shall be thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness and dimensions of parts, herein specified.

28. **GROUPING.**—Knuckles shall then be arranged in lots of 102 and, where possible, care should be taken to put all knuckles of the same melt number or numbers in the same lot or lots.

29. **PURCHASER'S INSPECTION.**—The inspector shall then inspect and gauge each knuckle as to its compliance with drawing, sizes, and for surface defects and proper contour lines. Any irregularities or swollen parts on the working or bearing faces shall be ground or chipped off before knuckles are accepted.

#### HEIGHT OF COUPLERS.

#### STANDARD.

The standard height of couplers for passenger equipment cars is 35 inches from top of rail when car is light. Adopted in 1890; see Proceedings 1890 and 1893.

In 1911 the order of the Interstate Commerce Commission, dated October 10, 1910, regarding the standard height of couplers, was adopted reading as follows:

The maximum height of drawbars for freight cars measured perpendicularly from the level of top of rails to the center of drawbars for standard-gauge railroads shall be 34½ inches and the minimum height of drawbars for freight cars on such standard-gauge railroads, measured in the same manner, shall be 31½ inches, and on narrow-gauge railroads the maximum height of drawbars for freight cars measured from the level of tops of rails to the center of drawbars shall be 26 inches, and the minimum height of drawbars for freight cars on such narrow-gauge railroads, measured in the same manner, shall be 23 inches, and on 2-foot gauge railroads the maximum height of drawbars for freight cars measured from

the level of the tops of rails to center of drawbars shall be  $17\frac{1}{2}$  inches, and the minimum height of drawbars for freight cars on such 2-foot gauge railroads, measured in the same manner, shall be  $14\frac{1}{2}$  inches.

#### ADJUSTING HEIGHT OF COUPLERS.

#### STANDARD.

In 1896 it was decided that in adjusting the height of couplers to meet the requirements of the United States law fixing the height from the top of rail to center of coupler for standard gauge cars in interstate traffic, cars should be adjusted when empty, as far as possible. In order to justify a bill for work done under the Rules of Interchange, an empty car should be adjusted to  $34\frac{1}{2}$  inches, or within  $\frac{1}{4}$  inch thereof, and when it is necessary to alter a loaded car it should be adjusted to  $33\frac{1}{2}$  inches, or within  $\frac{1}{4}$  inch thereof, or as near as possible to such height as will bring it to  $34\frac{1}{2}$  inches when the car is unloaded.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot.

This standard conforms to the order of the Interstate Commerce Commission dated October 10, 1910.

#### UNCOUPLING ARRANGEMENTS FOR M. C. B. COUPLERS. — RECOMMENDED PRACTICE.

##### Sheet M. C. B.—19-B.

In 1897 designs showing the details of uncoupling arrangements to concealed end sill cars and outside end sill cars were adopted as Recommended Practice.

In 1905 the shoulder of the bracket for the uncoupling rod was made bevel.

In 1908 these details were revised and changes made to overcome former defects.

The special feature of this uncoupling attachment is the slotted center bracket. By placing the rod back on top of end sill or head block a longer arm is obtained, which gives sufficient lift with ample slack in the chain, and by using a sloping slotted bracket the rod projects  $1\frac{1}{2}$  inches in front of coupler lock, which is about the best position for an efficient lift. The slotted bracket allows the rod to slide back  $3\frac{1}{2}$  inches and avoids interference when slack of train is bunched.

The handle shown should preferably project below end of car or be bent as shown by dotted lines on Sheet M. C. B.—C, in order to protect the operator's hand.

Three links  $3\frac{3}{4}$  inches,  $5\frac{3}{4}$  inches and  $7\frac{3}{4}$  inches long, respectively, are shown. By using one of these three links, therefore, a chain  $6\frac{1}{2}$ ,  $8\frac{1}{2}$  or  $10\frac{1}{2}$  inches long is obtained, which should fit all cars and M. C. B. couplers. These links should avoid the use of split links, "S" hooks and other temporary repair devices now very common. The arrangement as

a whole is applicable to all types of cars, and if properly applied will largely obviate present troubles. Only a few limiting dimensions are shown on the drawing, as the others must be adapted to each particular class of car; but the dimensions for center arm, chain slack and position of lift pin eye should be carefully adhered to.

In 1911 the uncoupling arrangements for M. C. B. coupler were made to conform to the requirements of the U. S. Safety Appliance Act, as shown on Sheets M. C. B. 19-A and 19-B. Details of uncoupling rod chain are shown on Sheet M. C. B. 23-A.

#### KNUCKLE PIVOT PIN TESTING MACHINE.

STANDARD.

Sheet M. C. B. 29-D.

In 1907 a design of apparatus for testing knuckle pivot pins was adopted as Recommended Practice, and is shown on Sheet M. C. B. 29-D.

#### BRAKE CHAINS.

STANDARD.

Sheet M. C. B. 23-A.

In 1909 dimensions for brake chains were adopted as Recommended Practice. Advanced to Standard in 1911.

#### CHECK CHAINS.

RECOMMENDED PRACTICE.

In 1893 the use of truck and car body check chains, properly applied, was adopted as a Recommended Practice. See Proceedings 1874, pages 27 and 72; Proceedings 1893. In 1896 it was agreed that this recommendation referred to passenger equipment cars only.

#### PLATFORM SAFETY CHAINS.

RECOMMENDED PRACTICE.

In 1893 a Recommended Practice was adopted for location and details of platform safety chains for passenger equipment cars. See Proceedings 1890 and 1893. In 1896 this was modified as follows: Platform Safety Chains for passenger equipment cars to be located 14½ inches each side of center; to be suitably attached to under side of platform timbers, and to be of such length that when extended horizontally the chain with hook shall measure 12¾ inches from face of end timber to bearing point of hook, and the chain with eye shall measure 2¾ inches from face of end timber to bearing point of eye. The hook shall not be more than 1¼ inches thick transversely, and the eye shall not be less than 1½ inches wide, or less than 4 inches long in its opening. When facing end of car the chain fitted with hook shall be on the left-hand side, and the chain fitted with eye on the right-hand side. See Proceedings 1896.

**SAFETY CHAINS FOR STEEL AND WOODEN FREIGHT CARS.**

**RECOMMENDED PRACTICE.**

**Sheet M. C. B.—E.**

In 1894 a Recommended Practice was adopted for Safety Chains for Freight Cars, when such chains are used. The use of safety chains on freight cars was not recommended, but when they are used on cars for special service a location is recommended as shown.

In 1904 a Recommended Practice for safety chains for Steel Freight Cars was adopted. See letter ballot, Proceedings 1904; also Sheet M. C. B.—E.

**SAFETY CHAINS.**

**RECOMMENDED PRACTICE.**

**Sheet M. C. B.—E.**

In 1905, as a result of letter ballot, the two designs of temporary safety chains for chaining together cars carrying double loads, shown on Sheet M. C. B.—E, were adopted as a Recommended Practice.

**SIGNAL LAMP SOCKET.**

**STANDARD.**

**Sheet M. C. B. 26.**

In 1903 a form of combination lamp holder and flag bracket was adopted as Recommended Practice. In 1911 the dimensions showing the slot and taper of the socket were advanced to Standard and the bracket omitted.

**SIDING, FLOORING, ROOFING AND LINING.**

**STANDARD.**

**Sheet M. C. B. 26.**

In 1901 the following specifications were adopted as standard:

*Flooring.*

Flooring shall be of three kinds: square-edged, dressed all over; ship-lapped, dressed all over; or tongued and grooved, dressed all over, in accordance with section shown on Sheet M. C. B. 26.

In 1908 the dimensions of dressed flooring were increased  $\frac{1}{4}$  inch.

In 1908 a drawing was added showing details of flooring  $2\frac{3}{4}$  inches thick for use on cars for rough freight.

In 1909 drawing was revised to show flooring of  $2\frac{3}{4}$ -inch finished section.

In 1912 the drawing was revised to show the under shoulder on the tongue edge set back  $\frac{1}{32}$  inch.

*Siding, Roofing and Lining.*

Siding, roofing and lining shall be of the section shown on Sheet M. C. B. 26.

In 1908 drawing was revised to show separate sections for roofing and lining.

In 1912 the drawing was revised to show the under shoulder on the tongue edge set back  $\frac{1}{32}$  inch.

## LINING FOR OUTSIDE-FRAMED CARS.

## RECOMMENDED PRACTICE.

Sheet M. C. B.—F.

In 1913 a section for lining for outside-framed cars was adopted as Recommended Practice.

## UNIFORMITY FOR SECTION OF CAR SILLS.

## STANDARD.

In 1899 the following finished sizes for sections of longitudinal car sills were adopted as standard of the Association:

For cars such as box, stock, flat, long gondolas, refrigerators, etc., 32 feet and over in length, but under 40 feet:

4 " x 8"	4 " x 9"	4 " x 10"	4½" x 12"	5" x 14"
4½" x 8"	4½" x 9"	4½" x 10"	5 " x 12"	
5 " x 8"	5 " x 9"	5 " x 10"		

For cars 40 feet long and over, such as furniture and special long gondolas:

4½" x 8"	4½" x 9"	5" x 10"	6" x 12"	6" x 14"
5 " x 8"	5 " x 9"	6" x 10"		
	6 " x 9"			

It is believed that the above recommendations afford a sufficient range of sizes to cover all requirements of design; they are good merchantable sizes, and if used as suggested car repairs will be greatly expedited, as there will be less delay in getting special sizes of lumber, and requisitions for regular sizes can be filled more promptly, as lumbermen can saw in advance of orders with a reasonable certainty of selling their stock.

## LETTERING AND MARKING OF CARS.

## STANDARD.

Sheet M. C. B. 26.

In 1896 it was decided:

That on all box cars standing more than twelve (12) feet from top of rail to eaves, the height and width at eaves be stenciled in 3-inch letters on side of car, as near the bottom as convenient.

That all classes of cars have size of coupler, style of rear attachments, kind of draft gear and style of brake beams stenciled in 2 or 3-inch letters

on each side of car at opposite ends, or on each end of car directly above coupler, where design of car permits it. Where the kind of draft gear implies the style of rear attachments, the marking for the latter may be omitted.

That where the construction of the truck permits, trucks shall be stenciled on each side, giving the size of journal, and the letters "M. C. B." if the axle is M. C. B. standard axle. If the axle is not M. C. B. standard, use dimensions from center to center of journal in place of M. C. B. This stenciling to be in 1 or 2-inch letters, and to be put on end or side of bolster in Diamond trucks, and on side truck frame in center on pedestal type of trucks.

Initials of the road should also appear in letters 1 or 2 inches high on one side of bolster or transom of each truck.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot. Modified in 1906 by the elimination of fractional sizes of figures and letters. Modified in 1908 and 1909.

In 1909 the following was adopted:

Flat cars should be stenciled with the length of car over end sills, measured at the center. The stencil, "Length 00 feet," to be located on side of car.

Drop end gondola cars should be stenciled with length of car inside of drop end doors, measured at the center; this stencil, "Inside length 00 feet," to be located on side of car.

#### Sheet M. C. B. 27.

As a result of a special letter ballot in March, 1906, certain sized letters and numerals were adopted as Recommended Practice for the uniform lettering of cars, as follows:

1. That Roman letters and figures of the design shown on Sheet M. C. B. 27 be used.

2. That the sizes of these letters and figures be confined to 1, 2, 3, 4, 7 and 9 inches.

3. That 7 and 9 inch letters or figures be used for the initials, names and numbers for the sides of cars, and 4-inch letters or figures for the lettering on the doors and ends of cars.

4. That for other car-body markings on sides and ends, such as capacity, couplers, brake beams, class of car, date built, outside and inside dimensions, and markings inside of car, 2 or 3 inch letters and figures be used, with the following exceptions:

- (a) All weight marks to be 3 or 4 inch letters or figures.

- (b) Trust marks, patent marks and other private marks should be 1-inch letters or figures.

5. That all marks on trucks be confined to 1 or 2 inch letters or figures.

6. That stenciling on air-brake cylinders or reservoirs be 1-inch letters or figures.

In 1911 these were advanced to Standard.

MARKING ON FREIGHT EQUIPMENT CARS.

STANDARD.

Sheet M. C. B. 26-A.

In 1909 the following was adopted:

1. Freight Equipment Cars that have a superstructure which will permit should be stenciled with markings on sides of car, in the following order:

Lettering (Initials or name of Road),  
Number,  
Capacity,  
Light Weight.

This marking is to be located as nearly over the truck as the lettering will permit, preferably to the left of center line of side of car. On box and other house cars where doors slide to the left, the above marking may be placed to the right of center line of side of car. On any other cars where the construction makes it necessary, this marking may be placed either to the right of center line of side of car, or in the center of side of car. The distance from the center line of coupler to the bottom of car number to be normally 2 feet 4½ inches, with a minimum dimension of 1 foot 10½ inches, and a maximum of 2 feet 10½ inches. The spacing of the remaining marking to be as shown on diagram.

The ends to show the initials or name of road, car number and light weight, in the upper half of end of car. On box or other house cars having end doors this lettering should be so located that it will not be obscured when doors are open.

Flat and low-sided gondola cars should show the lettering (initials or name of road), number, capacity and light weight on the side of car in the best available location offered by the construction of the car. Suggestions as to the arrangement of this lettering are shown on the diagrams. When possible the sizes of lettering and figures should correspond with present Recommended Practice. The end marking on flat cars may be omitted.

Side and end doors should be stenciled with the initials or name of road either on the outside or inside of door. If placed on the inside the stenciling should be so located that it will not be defaced by the sliding of the door.

In 1911 it was agreed that the "date weighed" should include the station symbol where weighed.

In 1912 the minimum height of number on steel underframe gondola cars above the center line of the coupler was changed from 1 foot 10½

inches to 1 foot 5 inches and Sheet M. C. B.—G changed accordingly. Advanced to Standard in 1913 and shown on Sheet M. C. B. 26-A.

In 1913, in order to conform to the requirements of the American Railway Association Car Service Rule No. 11 as amended November 20, 1912, the word "new" was arranged to precede the word "weight" on Sheet M. C. B. 26-A.

In 1912 the following paragraphs were incorporated under this head and the star indication added to Sheet M. C. B.—G:

"Wooden and steel underframe cars one year old should be reweighed and restenciled, the weight to be followed by one star; cars two years old should be again weighed and stenciled, the weight to be followed by two stars; cars three or more years old should be again weighed and stenciled, the weight to be followed by three stars, which will indicate final weight.

"Steel cars should be reweighed and restenciled after they have been in service twelve months, the weight to be followed by three stars, indicating final weight."

In 1913 the above method of weighing and stenciling cars was modified as follows:

"(a) Each new car must be weighed separately and the light weight, capacity in pounds,‡ station symbol and the date (month and year) must be marked thereon at the car works, under the supervision of the owner's inspector. The accuracy of the scales used must be certified to by a railroad scale inspector appointed by the car owner.

"These provisions to be incorporated in the contract covering the purchase of the equipment.

"(b) Wooden and steel underframe cars should be reweighed and remarked at least once every twelve months during the first two years the car is in service, and thereafter once every twenty-four months. All-steel cars should be reweighed and restenciled at least once every thirty-six months. A car must be clean when weighed for marking.

"The station symbol and the date (month and year) of each reweighing should be marked the same as provided for new cars in paragraph (a).

"(c) When a car is materially changed by repairs, alterations or repainting, it should be reweighed and remarked.

"(d) Any car without marking or which has not been reweighed and remarked within the prescribed period should be immediately reweighed and marked. If the car is reweighed at any time and is found to have a variation of over one per cent between the marked and the actual weight, it should be immediately remarked. When a car is remarked the car owner should be notified of the old and of the new weights, with place and date. The proper officer to whom these reports should be made will be designated in 'The Official Railway Equipment Register.'

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‡ and cubical capacity, except for flat and tank cars.

“(e) Whenever a weightmaster at a point not equipped for marking freight cars, as provided in paragraph (d), ascertains the light weight of a car which is not marked in accordance with this rule, he shall attach to the car the prescribed ‘Light Weight Card’ with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for remarking the car at first available station.”

In 1911 designating marks for cars equipped with United States Safety Appliance Standards were adopted as follows:

For cars built on or after July 1, 1911:

UNITED STATES  
SAFETY APPLIANCES,  
STANDARD.

For cars built prior to July 1, 1911:

UNITED STATES  
SAFETY APPLIANCES.

The above markings to be used on each side of the car: letters, if stenciled, to be not less than 1 inch in height and as per M. C. B. standards for lettering for freight cars, Sheet M. C. B. 27; letters, if on a metal badge plate, to be not less than  $\frac{1}{16}$ -inch and have not less than  $\frac{1}{8}$ -inch bar or staff. The arrangement of the words to be as near as possible as shown above.

A metal badge plate,  $3\frac{1}{2}$  by 10 inches, with the proper marking is preferred, one plate to be secured on each side of the car by four bolts or rivets, if on metal cars, and by four bolts or screws, if on wooden cars, the bolts, rivets or screws to be not less than  $\frac{1}{4}$ -inch diameter. The badge plate to be of metal as shown on drawing herewith.

○ UNITED STATES ○  
SAFETY-APPLIANCES  
○ STANDARD ○

## SPlicing OF STEEL CENTER SILLS.

STANDARD.

## Sheet M. C. B. 28.

At the convention of 1905, the following methods for splicing of center sills on steel cars and cars constructed with steel underframes were adopted as Recommended Practice. Drawings illustrative of these methods of splicing are shown on Sheet M. C. B. 28. In 1911 these splices were advanced to Standard.

The splice for center sills, except as otherwise herein stated, to be located not less than 7 inches from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end, but not exceeding 24 inches, and not less than same thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. "A" and "B," Sheet M. C. B. 28.

Fig. "A" shows the method of splicing center sills in front of body bolster, and Fig "B" shows method of splicing center sills back of body bolster.

Fig. "C" shows method of splicing in cases where cars are damaged to such extent that the center sills have to be cut off less than 8 inches from the front side of the body bolster; this method is not recommended for sills with protruding end less than 3 inches. The outside plate in this splice may be made of pressed steel or a casting. The rivets to be spaced as shown on sketch.

Fig. "D" shows the method of splicing side sills; this splice may be located on either side of the body bolster. The rivets to be spaced as shown on sketch.

In 1909 the illustrations shown on Sheet D were revised by the addition of end sills to drawing. Advanced to Standard in 1911.

In 1912 the text of standards was changed to show the limit of length of projection for splicing as 7 inches.

## SPlicing OF WOODEN SILLS.

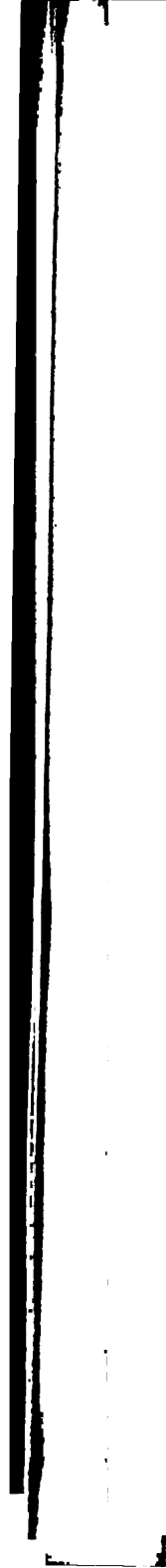
STANDARD.

## Sheet M. C. B. 28.

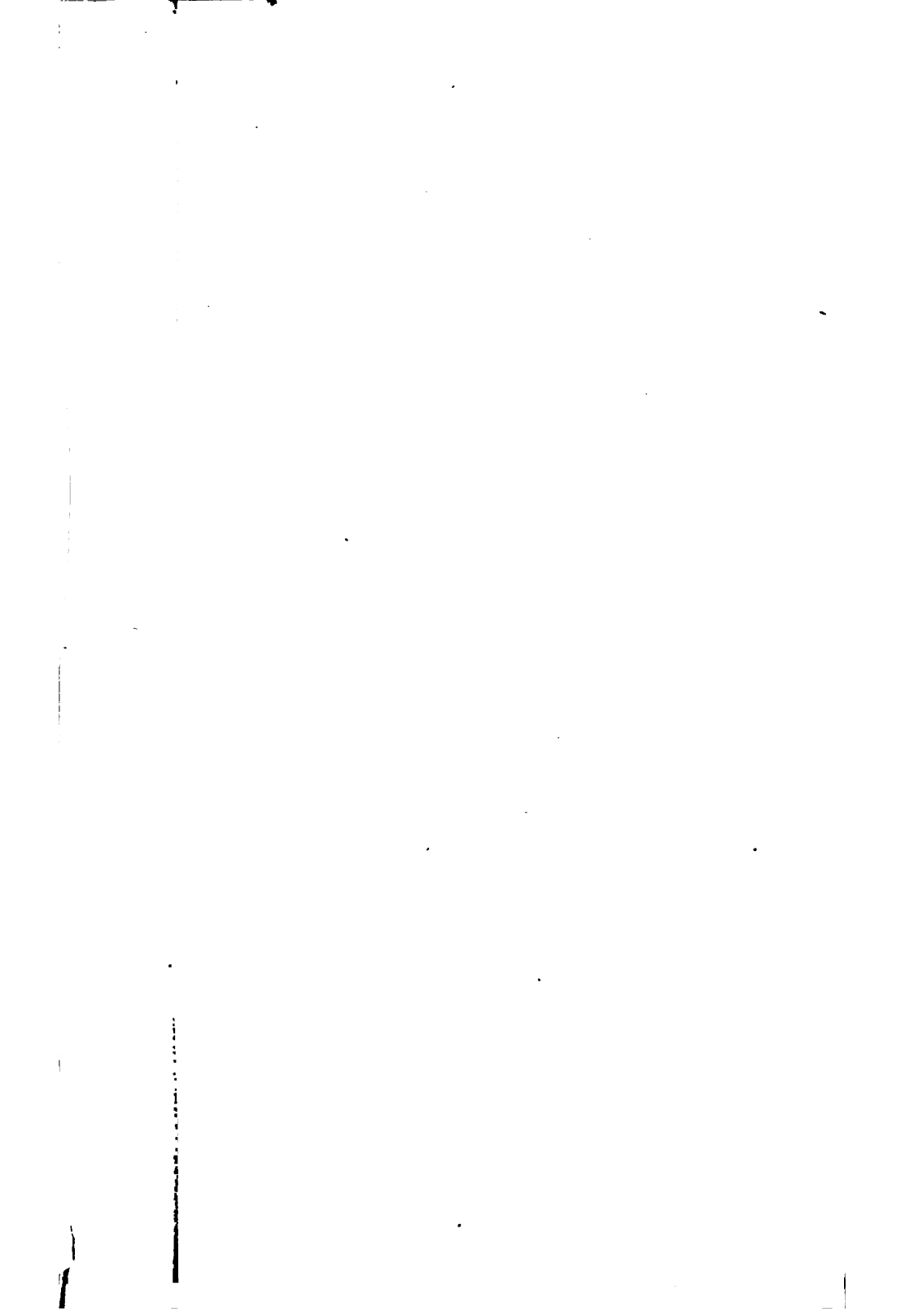
In 1909 the form of splice shown on Sheet M. C. B. 28 for the splicing of center sills of freight cars was adopted. Five-eighths inch diameter for bolts and  $1\frac{1}{16}$  inch for bolt holes were adopted as Recommended Practice for assembling sill splices for freight cars.

The butt or step splice, without side plank, was adopted for the splicing of all freight-car sills other than center sills.

In 1911 all reference to draft sills was omitted on account of being construed in some quarters to mean draft timbers, and the illustrations advanced to Standard.









## DROP-TEST MACHINE.

STANDARD.

Sheet M. C. B. 29-29-E.

In 1900 the drop-testing machine was modified and a further modification made in 1901. For details, see illustrations in report of committee, pages 147 to 154, Proceedings 1901. Further modification in 1903. See report of Coupler Committee, Proceedings 1903 and 1904. Modified in 1911 and advanced to Standard.

## PIPE UNIONS.

STANDARD.

In 1903 the dimensions for pipe unions as shown on accompanying table were adopted as standard.

In 1908 the following specifications were adopted:

That all wrought iron pipe for car work be threaded with a standard total taper of  $\frac{3}{4}$  inch in one foot, and that all pipe fittings be tapped to suit the standard pipe thread with a total taper of  $\frac{3}{4}$  inch in one foot, so that the thread on pipe and fittings will be uniform and taper-tight.

## SCREW THREADS, BOLT HEADS AND NUTS.

STANDARD.

The Sellers or Franklin Institute system of screw threads, bolt heads and nuts is the standard of the Association, and repeated action of the Association has deprecated the use of any other system and encouraged the careful maintenance of these standards. See Proceedings 1872, pages 18 and 21; Proceedings 1879, pages 82 and 83; Proceedings 1882, page 229.

A set of gauges for standard screw threads and a standard inch scale, 2 feet long, are held in the office of the Secretary for reference.

Mr. Sellers, who proposed this system of screw threads, described it in an essay read before the Franklin Institute of Philadelphia, April 21, 1864, as follows:

"The proportions for the proposed thread and its comparative relation to the sharp and rounded threads, will be readily understood from the accompanying diagram in which Figs. 11 and 12—the latter on an exaggerated scale—represent a sharp thread, Figs. 13 and 14 a rounded top and bottom to the English proportion, and Figs. 15 and 16 the flat top and bottom, all of the same pitch. The angle of the proposed thread is fixed at  $60^\circ$ , the same as the sharp thread, it being more readily obtained than  $55^\circ$ ; and more in accordance with the general practice in this country. Divide the pitch, or, which is the same thing, the side of the thread, into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread, then the flat top and bottom will

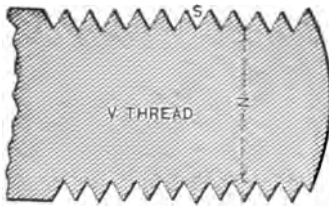
FIG. 11.  $\sim 55^\circ$ FIG. 13.  $\sim 60^\circ$ 

FIG. 15.

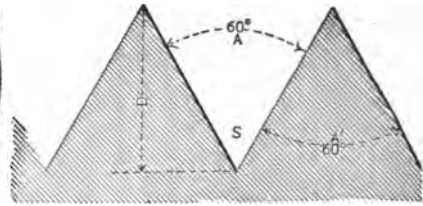


FIG. 12.

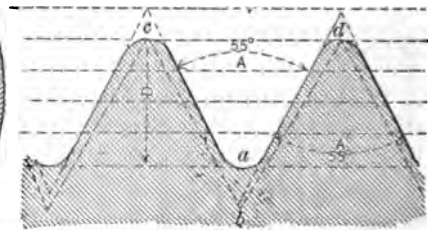


FIG. 14.

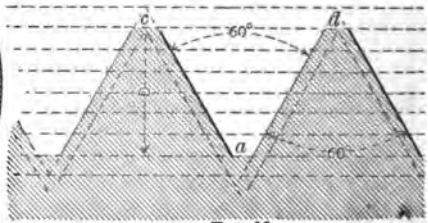


FIG. 16.










equal one-eighth of the pitch; the wearing surface will be three-quarters of the pitch, and the diameter of screw at bottom of the thread will be expressed by the formula:

$$\text{Diameter} = \frac{1,299}{\text{number of threads per inch.}}$$

The accompanying tables are reprinted from Mr. Sellers' essay: they give the proportions of his standard screw threads, nuts and bolt heads:



# PROPORTIONS FOR SELLERS' STANDARD NUTS AND BOLTS.

	<p>Rough Nut = one and one-half diameter of bolt + <math>\frac{1}{8}</math>.</p>		<p>Finished Nut = diameter of bolt — <math>\frac{1}{16}</math>.</p>		<p>Rough Head = one-half distance between parallel sides of head.</p>
	<p>Finished Nut = one and one-half diameter of bolt + <math>\frac{1}{16}</math>.</p>		<p>Rough Head = one and one-half diameter of bolt + <math>\frac{1}{16}</math>.</p>		<p>Finished Head = diameter of bolt — <math>\frac{1}{16}</math>.</p>
	<p>Rough Nut = diameter of bolt.</p>		<p>Finished Head = one and one-half diameter of bolt + <math>\frac{1}{16}</math>.</p>		

NOTE.—In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice: The side of the head shall be one and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head. See Recommended Practice. In 1900 these dimensions were adopted as Standard.

**SQUARE BOLT HEADS.****STANDARD.**

In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice:

The side of the head shall be one and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head.

In 1900 these dimensions were adopted as a Standard.

**END FOR HOPPER DOOR OPERATING SHAFT.****RECOMMENDED PRACTICE.**

Sheet M. C. B.—F.

In 1913 a 2-inch square end for hopper door operating shaft was adopted as Recommended Practice.

**M. C. B. REPORTS.****STANDARD.**

In 1893 a standard size of 6 inches by 9 inches was adopted for M. C. B. reports. See Proceedings 1893.

**PAMPHLETS, CATALOGUES, SPECIFICATIONS, ETC.****STANDARD.**

In 1894 standard sizes for publications of this nature were adopted and the size of postal card circular was changed in 1895 so that they are now as follows:

For postal card circulars,  $3\frac{1}{2}$  inches by  $5\frac{1}{2}$  inches.

For pamphlets and trade catalogues  $\left\{ \begin{array}{l} 3\frac{1}{2} \text{ inches by } 6 \text{ inches.} \\ 6 \text{ inches by } 9 \text{ inches.} \\ 9 \text{ inches by } 12 \text{ inches.} \end{array} \right.$

For specifications and letter paper, 8 inches by  $10\frac{1}{2}$  inches.

In connection with these standards it was decided that a standard practice should be to have the proper standard dimensions, and the word "standard" printed on the upper left-hand corner of title-page or cover whenever practicable.

In 1912 the standard size of specifications and letter paper was changed to the Government standard, namely, 8 by  $10\frac{1}{2}$  inches.

**LOADING RULES.****STANDARD.**

In 1893 a Recommended Practice was adopted for loading logs and poles on cars and for racking cars for loading bark, and in 1896 extended rules governing the loading of lumber and timber on open cars were adopted, replacing the former practice heretofore shown on Sheet M. C. B.—B, with the exception of racking cars for loading bark. At the same time rules governing the loading of long structural material, rails, plates, girders, etc., were adopted.

In 1897 some modification of these rules was adopted, with slight changes in the illustrations also. In 1898 still further slight changes were made in the text and in some of the drawings, and a new section was added containing rules for loading large logs, pipe and stone on open cars. In 1900 a further modification was made in both text and illustrations.

Further revision, 1904; also, 1905; also, 1906.

In 1908 a further revision was made, and the rules advanced to Standard. Modified in 1910, 1911, 1912 and 1913.

A separate pamphlet is issued by the Association containing these rules.

## RULES FOR LOADING MATERIALS ON OPEN CARS.

### GENERAL INSTRUCTIONS.

1. The rules here given cover only the more common forms of lading. Where it is found they do not apply, special instructions must be asked for.

2. Cars must be carefully examined, **ALL DEFECTS REMEDIED**, and should be properly cambered.

3. Where maximum weights of lading are not specified, the usual excess of ten per cent will be allowed.

4. All single cars must be so loaded that one **HAND BRAKE** is **ACCESSIBLE AND OPERATIVE**. There must be a clearance of at least six (6) inches between the brake wheel and lading, as per Fig. 1.

5. Cars should be in such condition that the trucks can curve freely. The maximum side bearing clearance for loaded cars must not be more than  $\frac{3}{8}$  inch for loads less than 10 feet high from top of rail, and must not exceed  $\frac{1}{4}$  inch for loads 10 feet high or over from top of rail.

6. The height and width of lading must be governed by the clearance limits of the roads over which the lading is to pass.

7. Lading will not be accepted if placed on top of box or stock cars. If lading is placed on top of wooden cars having sides not more than 36 inches high and not less than 3 inches thick, or steel cars with sides especially reinforced with gusset braces, the bearing-pieces must be supported and held in place as per Figs. 32 and 33, Rule No. 81; also Fig. 45, Rule No. 92. If lading is placed on the top of steel car sides or wooden car sides less than three (3) inches thick, the supports and bearing-pieces must be sufficiently strong to transmit the strain to the car floor and provide against shifting, as shown in Figs. 44, 45-A and 45-B, Rule No. 92.

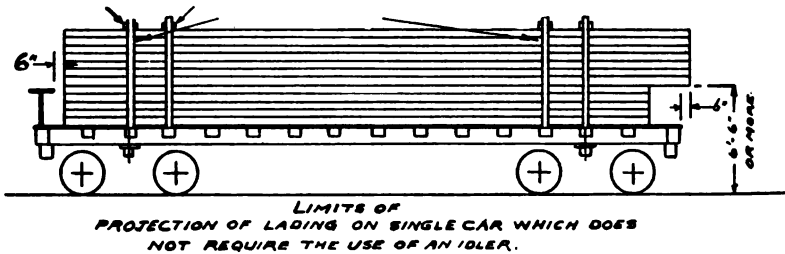
A single overhanging load with one bearing-piece located on top of car sides over bolster on all steel gondola cars with sides of sufficient strength, must have the bearing-piece supported and held in place as shown in Fig. 33-A.

8. No truck of any car will be allowed to carry more load than **ONE-HALF OF THE MARKED CAPACITY OF CAR, PLUS TEN PER CENT**, for overload. In case of doubt, this must be verified by weighing.

9. Lading on single cars must never project over end sill of car, unless such overhang is protected by an idler or carrying car forming part of a group of cars, except when this projection is six (6) feet six (6) inches or more above top of rail and does not overhang end sill more than six (6) inches, as per Fig. 1.

10. An **IDLER** must be used to protect the overhanging load on another car when the load projects over end sill at a height less than six (6) feet six (6) inches from top of rail, or when the load projects more than six (6) inches at a height of more than six (6) feet six (6) inches from top of rail. The idler forms part of the shipment, and must not be detached, during transit, from the loaded car, except for cause, when it must be

FIG. 1.



replaced by another car serving the same purpose and governed by the same restrictions.

If the idler is a flat car of wooden construction, its capacity must not be less than that of the carrying cars.

11. The width of overhanging load placed on single cars must never exceed the following dimensions. When all the pieces are of approximately the same length the length of overhang should not exceed eighteen (18) feet, but shipments may contain pieces overhanging as much as twenty-four (24) feet provided the average length of the overhang of the total load does not exceed eighteen (18) feet.

Length of Overhang.	Width of Load.	Length of Overhang.	Width of Load.
C	W	C	W
9 ft. 0 in.	9 ft. 5 in.	18 ft. 0 in.	8 ft. 1 in.
10 ft. 6 in.	9 ft. 2½ in.	19 ft. 6 in.	7 ft. 0 in.
12 ft. 0 in.	9 ft. 0 in.	21 ft. 0 in.	6 ft. 4 in.
13 ft. 6 in.	8 ft. 9½ in.	22 ft. 6 in.	5 ft. 8 in.
15 ft. 0 in.	8 ft. 7 in.	24 ft. 0 in.	5 ft. 0 in.
16 ft. 6 in.	8 ft. 4 in.		

The overhang is measured from center of truck to extreme end of overhang, and load must be placed to maintain level on side bearings. See Figs. 23 and 24.

For loads of greater height than 12 feet, subtract 2 inches for given width (w) of load for every inch of height in excess of 12 feet.

12. All stakes, clamping-pieces, bearing-pieces and braces must be sound straight-grained lumber (hard-wood preferred) and free from knots that would materially impair their strength, or rolled or built-up steel sections of equal strength. Hemlock may only be used for single loads of sawed lumber, as provided for in Rule 32, Fig. 4, and for loading of tan bark, Rule 60, and loading of slab wood, Rule 66, and for chocking and blocking for any loads. Care must be taken to keep the stakes from spreading at the top while the cars are being loaded, and in no case must the load exceed the width of the car. Unless otherwise speci-

fied, stakes for flat and gondola cars with sides less than thirty (30) inches high, should be four (4) inches wide by five (5) inches deep, or saplings five (5) inches in diameter at center. For gondola cars with sides thirty (30) inches high or over, stakes must be four (4) inches wide by (4) inches deep, or saplings four (4) inches in diameter at center, tapered at the end to accurately fit, extend through and completely fill the stake pockets.

For flat and gondola cars with sides less than 30 inches the recommended stake should be used, but for gondola cars with sides 30 inches or over, stakes 3 inches wide by 4 inches deep may be used as the minimum size for general loading, except for lumber, which is provided for in Rule 34.

(a) Stakes may be placed on inside of gondola cars, provided they rest on the car floor and are substantially secured at the bottom ends and at the top of car sides, to prevent shifting. Gondola cars not equipped with stake pockets to suit the required number and size of stakes should have the stakes placed inside of car side.

(b) Where dimensions of stakes are given, the first figure, representing the width of stake, is measured parallel with side of car; and the second figure, representing depth of stake, is measured at right angles to side of car.

(c) If stakes are of smaller dimensions than stake pockets they must be wedged to completely fill the pockets, and the wedges must be securely nailed to the stakes.

13. Opposite stakes must always be fastened together. When the specified fastening is by means of boards, there must be two boards for every pair of stakes, each board not less than one (1) by five (5) inches in section, and fastened at each end by not less than three ten-penny wire nails. (Hemlock may only be used for single loads of sawed lumber, as provided for in Rule 32, Fig. 4, and for loading of tan bark, Rule 60, and loading of slab wood, Rule 66.) When the specified fastening is by means of wire, the wire used, unless otherwise specified, must be equal to six (6) strands or three (3) wrappings of good  $\frac{1}{8}$ -inch diameter wire, and the wire must be secured to prevent it from slipping.

Three-sixteenth-inch diameter wire will be accepted as a substitute throughout the rules, provided the ends are securely twisted:

Two strands or 1 wrapping of 3-16-inch wire will be equivalent to 6 strands (3 wrappings)  $\frac{1}{8}$ -inch diameter wire.

Four strands or 2 wrappings of 3-16-inch wire will be equivalent to 10 strands (5 wrappings)  $\frac{1}{8}$ -inch diameter wire.

14. Whenever cars are offered in INTERCHANGE and STAKES are not placed according to detail instructions, additional stake pockets may be applied by the receiving road and the cost of same charged to the delivering road.

15. The WEIGHT OF LADING carried on any car must be governed not only by the marked capacity of the car, but also by its general construc-

tion, as well as by the number and location of the bearing-pieces upon which the load rests.

To prevent overloading, the following regulations must be adhered to. Where reference is made to the capacity of car, it implies marked capacity plus ten per cent.

(a) For loads carried on one bearing or sliding piece per car located near the center of car: On flat cars having only two truss rods the weight of lading must not exceed one-half of the capacity of car. On flat cars having more than two truss rods, and on low-sided gondola cars, the weight of lading must not exceed two-thirds of the capacity of car.

(b) For loads carried on one bearing or sliding piece per car located about equal distance from center of car and center of truck: On flat cars not exceeding thirty-four (34) feet in length and having only two truss rods the weight of lading must not exceed two-thirds the capacity of car; on flat cars more than thirty-four (34) feet in length having only two truss rods the weight of lading must not exceed one-half the capacity of car. On flat cars having more than two truss rods, and on low-sided gondola cars, the weight of lading must not exceed three-fourths of the capacity of car.

(c) For loads carried on one bearing or sliding piece per car, located at or near center of truck, or on top of sides of gondola cars located at any point between the bolsters, the weight of lading must not exceed one-half the capacity of the car. (See also Sec. E of Rule No. 15 and Rule No. 23.)

For loads on top of sides of gondola cars, the distance from top of rail to center of load, measured at bearing-pieces, must not exceed 9 feet 3 inches.

(d) Short material may be carried on floor of gondola cars under loads carried on top of sides, but should be distributed so that the load carried over each truck as well as across floor of car is equally balanced. The total load for wooden cars with wooden underframes must not exceed three-fourths ( $\frac{3}{4}$ ) the capacity of the car, and for cars with steel underframes the total load must not exceed the capacity of car.

(e) For twin or triple loads of long, flexible material, such as plates or similar lading, requiring two or more sliding pieces in addition to the bearing pieces, the weight of lading must not exceed one-half the capacity of the car, and must conform to Figs. 41, 42, 43, 43-A and 43-B. For materials of less flexibility, such as heavy channels and "I" beams, see Rules 15-A, 15-B and 15-C, and Figs. 39 and 40. For tee and girder rails 60 and 65 feet long, loaded on flat cars, having four or more truss rods, or on gondolas with drop ends, the lading may equal the marked capacity of the car.

(f) For loads carried on one bearing-piece on steel cars, or cars having steel underframes, the cars should be treated the same as those of wooden construction having more than two truss rods.

(g) Cars having drop ends shall not be loaded on top of sides unless corner stakes have been suitably reinforced.

The only exceptions are for cars which have been specially prepared for the shipment of particular forms of material.

#### LOADS TOO LONG FOR SINGLE CARS.

16. The **CONSIGNEE AND DESTINATION** of all the material in a group of cars must be the same.

17. The lading must always be kept **CLEAR OF THE FLOOR AND END GATES OF THE CARS**, both carrying cars and idlers. The amount of this clearance must not be less than four (4) inches and must conform to Rule 51.

18. A group of cars must have at least one accessible and operative hand brake for three cars, and two hand brakes for more than three cars.

19. All **CARRYING CARS** must be considered of the same capacity as the one of lesser capacity.

20. Flat cars must always be used when the load rests partly on one car and partly on another car, except where special provision is made for other types of cars.

21. Where the **LADING PROJECTS** over end sill, necessitating the use of an **IDLER**, and there is sufficient material in one consignment, another car may be loaded in reverse order and one idler serve for both cars. The space between the projecting ends of loads may be utilized to load the idlers with short material, but, in all cases, there must be a space of at least two (2) feet between the ends of such loadings.

22. Where the dimensions of bearing-pieces are not otherwise specified, they must be of sufficient thickness to keep the lading four (4) inches from the floor or end gates of carrying car and idler, and must extend the full width of car. Bearing-pieces more than five (5) inches high may be built up of lumber of ample strength or take the shape of cribbing, or rolled or built-up steel construction. Bearing-pieces, sliding-pieces, chocks, headblocks, etc., must have a width of base at least equal to their height. These bearing-pieces must be securely fastened to the floor of the car as provided for in Rule No. 72.

23. **BEARING-PIECES** and sliding-pieces must never be placed between bolster and end of car, unless special provision is made therefor in detail instructions. When there is but one bearing-piece on a car, it must be placed at least twelve (12) inches from center of bolster toward center of car.

24. The preferable distance between bearing-pieces under lading on two or more cars is seven-tenths (7-10) of the total length of lading, with allowable variation from six-tenths to eight-tenths.

25. The width of long loads must never exceed the following dimensions for the given distance between bearing-pieces or length of overhang when load does not exceed twelve (12) feet in height, measured from top of rail. For loads of greater height, subtract two (2) inches from given width (W) of load for every inch of height in excess of twelve (12) feet.

Distance Between Bearing-pieces.	Length of Overhang.	Width of Load.
D	C	W
35 ft. 0 in.	7 ft. 6 in.	9 ft. 6 in.
38 ft. 6 in.	8 ft. 3 in.	9 ft. 4 in.
42 ft. 0 in.	9 ft. 0 in.	9 ft. 1½ in.
45 ft. 6 in.	9 ft. 9 in.	8 ft. 11½ in.
49 ft. 0 in.	10 ft. 6 in.	8 ft. 8½ in.
52 ft. 6 in.	11 ft. 3 in.	8 ft. 5½ in.
56 ft. 0 in.	12 ft. 0 in.	8 ft. 2½ in.
59 ft. 6 in.	12 ft. 9 in.	7 ft. 11½ in.
63 ft. 0 in.	13 ft. 6 in.	7 ft. 7½ in.
66 ft. 6 in.	14 ft. 3 in.	7 ft. 4 in.
70 ft. 0 in.	15 ft. 0 in.	7 ft. 0 in.
73 ft. 6 in.	15 ft. 9 in.	6 ft. 7½ in.
77 ft. 0 in.	16 ft. 6 in.	6 ft. 3½ in.
80 ft. 6 in.	17 ft. 3 in.	5 ft. 11 in.
84 ft. 0 in.	18 ft. 0 in.	5 ft. 6½ in.

26. The cars must be jacked apart by placing one jack on each side of the coupler, separating the cars until the couplers are pulled out to the fullest extent, inserting hardwood or metal blocks to completely fill the space between horns of coupler and end of sill, disconnecting the lock pin connection if secured to body of car, as shown in Figs. 2 and 3.

27. When cars are used which are not equipped with permanent safety chains, chains, if used, should be passed around body bolster and across under center sills, forming a loop back of bolster and doubling to point of coupling between the two cars and so tie them together as shown in Fig. 3. These long chains must have only a sufficient amount of slack to permit the cars to curve.

28. The INSPECTOR, in whose district the cars are to be loaded, must assure himself that the cars are properly blocked apart.

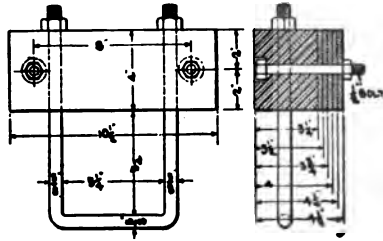
29. All DIMENSIONS given for blocking, bracing, bearing-pieces and rods are general, but represent the LEAST ALLOWABLE SIZE for loads exceeding one-half the capacity of car. For lighter loads the dimensions may be proportionately decreased, except where the size of timbers given is governed by the required clearance; however, any material that may be suitable for blocking, which differs from the figures given, but which is of equal strength or stronger, may be utilized.

30. Material in open cars requiring special staking or clamping and all material carried on two or three cars must always be examined by a competent INSPECTOR before the cars are moved from the loading point. If an inspector is not stationed at the loading point, the agent must give notice to the proper authority when the cars are loaded, so that proper inspection may be arranged for. The object of such inspection is to see that these regulations have been complied with.

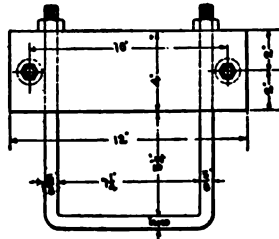
31. If, in loading cars, it is impossible to clearly ascertain whether the restrictions given in General Instructions under paragraphs 8 and 15 are complied with, the following table may be used:

FIG. 2.

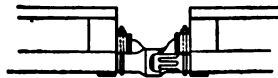
METAL SPACING BLOCKS FOR TWIN AND TRIPLE LOADS.



DETAIL OF BLOCK FOR 5"X5" SQUARE



DETAIL OF BLOCK FOR 5"X7" SQUARE

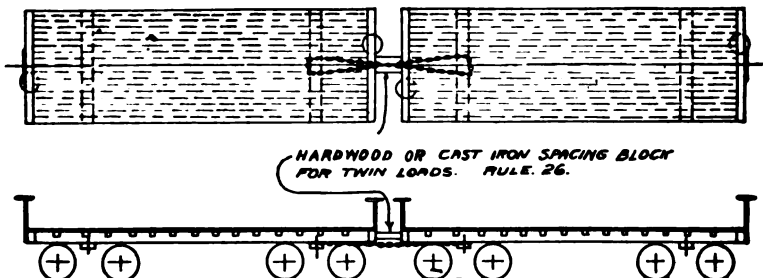


ELEVATION SHOWING APPLICATION OF BLOCK

FIG. 3.

CHAINING OF CARS WHEN LOADED WITH LONG MATERIAL.

SIZE OF CHAIN TO CONFORM TO M. C. B. RECOMMENDED PRACTICE.



**MAXIMUM WEIGHT OF LOAD.**  
**FOR LOADS AS PER FIGS. 6, 7, 23, 24 AND 33-A.**

Length of Cars.	Length of Material.	Capacity of Cars 60,000 lbs.	Capacity of Cars 80,000 lbs.	Capacity of Cars 80,000 lbs.	Capacity of Cars 100,000 lbs.
30 ft.	30 ft.	46,000 lbs.	57,000 lbs.	76,000 lbs.	.....
	32 "	42,000 "	53,000 "	71,000 "	.....
	34 "	39,000 "	49,000 "	65,000 "	.....
	36 "	37,000 "	45,000 "	60,000 "	.....
32 ft.	32 "	47,000 "	58,000 "	77,000 "	.....
	34 "	44,000 "	54,000 "	72,000 "	.....
	36 "	41,000 "	50,000 "	66,000 "	.....
	38 "	38,000 "	47,000 "	61,000 "	.....
34 ft.	36 "	45,000 "	55,000 "	73,000 "	.....
	38 "	42,000 "	51,000 "	69,000 "	.....
	40 "	39,000 "	48,000 "	64,000 "	.....
	42 "	37,000 "	45,000 "	60,000 "	.....
40 ft.	40 "	.....	.....	.....	97,000 lbs.
	42 "	.....	.....	.....	92,000 "
	44 "	.....	.....	.....	87,000 "
	46 "	.....	.....	.....	83,000 "
42 ft.	48 "	.....	.....	.....	79,000 "
	50 "	.....	.....	.....	75,000 "
	53 "	.....	.....	.....	70,000 "
	42 "	.....	.....	.....	98,000 "
42 ft.	44 "	.....	.....	.....	93,000 "
	46 "	.....	.....	.....	88,000 "
	48 "	.....	.....	.....	84,000 "
	50 "	.....	.....	.....	80,000 "
42 ft.	52 "	.....	.....	.....	77,000 "
	55 "	.....	.....	.....	73,000 "

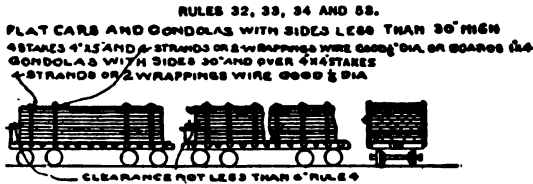
**FOR LOADS AS PER FIG. 10.**

Length of Material	A	B	C	D	Marked Capacity of Cars Pounds.	Maximum Aggregate Weight of Load. Pounds.
When loaded on cars 30 to 32 ft. long.					50,000	105,000
40 ft.	10' 3"	8' 0"	5' 9"	24' 0"		
45 ft.	11' 9"	4' 0"	6' 3"	27' 0"		
When loaded on cars 34 to 36 ft. long.					60,000	120,000
40 ft.	10' 3"	10' 0"	5' 9"	24' 0"		
45 ft.	11' 9"	6' 6"	6' 3"	27' 0"		
When loaded on cars 38 ft. long.					80,000	160,000
50 ft.	10' 0"	12' 0"	5' 0"	35' 0"		
55 ft.	12' 0"	2' 0"	8' 0"	35' 0"		
When loaded on cars 40 ft. long.					100,000	200,000
50 ft.	10' 0"	18' 0"	5' 0"	35' 0"		
55 ft.	12' 0"	8' 0"	5' 0"	38' 0"		

# RULES GOVERNING THE LOADING OF LUMBER ON OPEN CARS.

## DETAIL INSTRUCTIONS.

FIG. 4.



FOR NUMBER AND MINIMUM SIZE OF STAKES SEE SECTIONS OF RULE 34.  
LUMBER LOADED ON SINGLE CARS, AS IN FIG. 4.

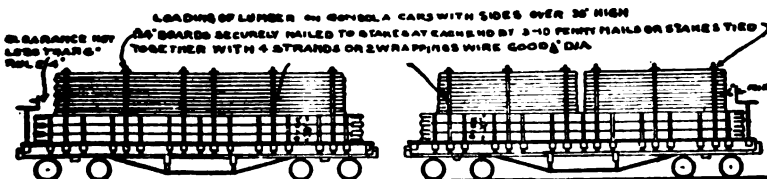
32. Where the length of lumber will permit, it must be similarly loaded in two piles on floor of car.

33. Lumber of equal widths must either be lapped or have strips not less than  $\frac{3}{8}$  inch thick by 3 inches wide, the full width of load, spaced 6 feet apart longitudinally to act as binders. Strips should be located not more than 30 inches apart vertically from floor of flat cars. Strips for gondola cars should also be spaced 30 inches apart vertically, the first strip to be at top of sides. There should be at least three vertical rows of strips per pile.

34. For flat and gondola cars with sides less than 30 inches high the stakes should be 4 inches wide by 5 inches deep, and for gondola cars with sides 30 inches high and over the stakes should be 4 inches wide by 4 inches deep straight-grained lumber, free from knots that would materially impair their strength, hardwood preferred. Tops of opposite stakes must be held together by two boards 1 inch thick by 4 inches wide, fastened at each end by not less than three ten-penny nails, or by four strands equal to two wrappings of good  $\frac{1}{8}$ -inch diameter wire. See Figs. 4 and 4-A. For overhanging loads it must conform to Rule 13.

FIG. 4A.

RULES 32, 33 AND 34.



The cross boards or wire should clear top of lading by at least two inches. If the number of stakes is greater than indicated in Sections A, B and C, but conforms to Section D of this rule, the wiring may be reduced to two strands equal to one wrapping of good  $\frac{1}{8}$ -inch diameter wire.

**SECTION A.**—For loads in one or more piles on single cars the number of hardwood stakes must not be less than:

3 pair per pile for lengths not exceeding 20 feet.

4 pair per pile for lengths exceeding 20 feet.

**SECTION B.**—For loads of lumber with joints well lapped or stripped at intervals of not less than 30 inches in height or 6 feet 0 inches in length, the sizes of hardwood stakes must not be less than:

3 by 2 inches for load-height, not exceeding 3 feet 0 inches.

4 by 2 inches for load-height, between 3 feet 0 inches and 6 feet 0 inches.

3 by 4 inches for load-height, above 6 feet 0 inches.

**SECTION C.**—For loads of lumber not lapped or stripped, the sizes of hardwood stakes must not be less than:

2 by 4 inches for load-height, not exceeding 3 feet 0 inches.

3 by 4 inches for load-height, between 3 feet 0 inches and 6 feet 0 inches.

4 by 4 inches for load-height, above 6 feet 0 inches.

Heights of load given are measured either from floor line of flat cars or from top of sides of gondola cars.

**SECTION D.**—The following substitutes may be used for minimum sizes of hardwood stakes specified in preceding Sections B and C for single loads of lumber of one or more piles:

*Substitutes for Each Pair of 4 by 2 Inch Hardwood Stakes.*

One pair 3-inch saplings.	Hardwood.
One pair 4 by 3 inch stakes.	} Hemlock or similar wood.
One pair 6 by 2½ inch stakes.	
One pair 8 by 2 inch stakes.	
One pair 4-inch saplings.	
Two pair 4 by 2 inch stakes.	
Two pair 3-inch saplings.	

*Substitutes for Two Pair of 2 by 4 Inch Hardwood Stakes.*

Two pair 3½-inch saplings.	} Hardwood.
Four pair 3-inch saplings.	
Four pair 4 by 2 inch stakes.	

Two pair 4 by 4 inch stakes.	}	Hemlock or similar wood.
Two pair 4½-inch saplings.		
Three pair 3 by 4 inch stakes.		
Four pair 2 by 4 inch stakes.		
Four pair 3½-inch saplings.		
Eight pair 3-inch saplings.		

*Substitutes for Three Pair of 2 by 4 Inch Hardwood Stakes.*

Three pair 3½-inch saplings.	}	Hardwood.
Five pair 3-inch saplings.		
Six pair 4 by 2 inch stakes.		
Three pair 4 by 4 inch stakes.	}	Hemlock or similar wood.
Three pair 4½-inch saplings.		
Four pair 3 by 4 inch stakes.		
Six pair 2 by 4 inch stakes.		
Six pair 3½-inch saplings.		
Ten pair 3-inch saplings.		

*Substitutes for Two Pair 3 by 4 Inch Hardwood Stakes.*

Two pair 4-inch saplings.	}	Hardwood.
Three pair 2 by 4 inch stakes.		
Three pair 4 by 3 inch stakes.		
Two pair 6 by 3 inch stakes.		
Two pair 12 by 2 inch stakes.		
Three pair 8 by 2 inch stakes.		
Four pair 6 by 2 inch stakes.		
Two pair 4 by 5 inch stakes.	}	Hemlock or similar wood.
Two pair 5-inch saplings.		
Three pair 4 by 4 inch stakes.		
Four pair 4-inch saplings.		
Six pair 2 by 4 inch stakes.		
Six pair 4 by 3 inch stakes.		
Four pair 6 by 3 inch stakes.		
4 pair 12 by 2 inch stakes.		
Six pair 8 by 2 inch stakes.		
Eight pair 6 by 2 inch stakes.		

*Substitutes for Three Pair 3 by 4 Inch Hardwood Stakes.*

Three pair 4-inch saplings.	}	Hardwood.
Three pair 6 by 3 inch stakes.		
Five pair 2 by 4 inch stakes.		
Four pair 4 by 3 inch stakes.		
Three pair 12 by 2 inch stakes.		
Four pair 9 by 2 inch stakes.		
Six pair 6 by 2 inch stakes.		

Three pair 4 by 5 inch stakes.	}	Hemlock or similar wood.
Three pair 5-inch saplings.		
Six pair 4-inch saplings.		
Five pair 4 by 4 inch stakes.		
Six pair 3 by 4 inch stakes.		
Four pair 8 by 3 inch stakes.		
Eight pair 4 by 3 inch stakes.		
Six pair 12 by 2 inch stakes.		
Eight pair 9 by 2 inch stakes.	}	
Twelve pair 6 by 2 inch stakes.		

*Substitutes for Two Pair 4 by 4 Inch Hardwood Stakes.*

Two pair 4½-inch saplings.	}	Hardwood.
Three pair 3 by 4 inch stakes.		
Four pair 2 by 4 inch stakes.		
Two pair 8 by 3 inch stakes.		
Four pair 4 by 3 inch stakes.		
Two pair 16 by 2 inch stakes.		
Four pair 8 by 2 inch stakes.	}	
Eight pair 4 by 2 inch stakes.		
Three pair 4 by 5 inch stakes.	}	Hemlock or similar wood.
Three pair 5-inch saplings.		
Four pair 4 by 4 inch stakes.		
Four pair 4½-inch saplings.		
Six pair 3 by 4 inch stakes.		
Eight pair 2 by 4 inch stakes.		
Four pair 8 by 3 inch stakes.		
Eight pair 4 by 3 inch stakes.		
Four pair 16 by 2 inch stakes.		
Six pair 11 by 2 inch stakes.		
Eight pair 8 by 2 inch stakes.		
Sixteen pair 4 by 2 inch stakes.		

*Substitutes for Three Pair of 4 by 4 Hardwood Stakes.*

Three pair 4½-inch saplings.	}	Hardwood.
Four pair 3 by 4 inch stakes.		
Six pair 2 by 4 inch stakes.		
Three pair 8 by 3 inch stakes.		
Six pair 4 by 3 inch stakes.	}	Hemlock or similar wood.
Four pair 4 by 5 inch stakes.		
Four pair 5-inch saplings.		
Six pair 4 by 4 inch stakes.		
Eight pair 3 by 4 inch stakes.		
Twelve pair 2 by 4 inch stakes.		
Six pair 7½ by 3 inch stakes.		
Eleven pair 4 by 3 inch stakes.		

*Substitutes for Two Pair of 4 by 5 Hardwood Stakes.*

Two pair of 5-inch saplings.	} Hardwood.
Three pair 4 by 4 inch stakes.	
Four pair 3 by 4 inch stakes.	
Four pair 4 by 5 inch stakes.	} Hemlock or similar wood.
Four pair 5-inch saplings.	
Six pair 4 by 4 inch stakes.	
Eight pair 3 by 4 inch stakes.	

*Substitutes for Three Pair 4 by 5 Hardwood Stakes.*

Three pair 5-inch saplings.	} Hardwood.
Five pair 4 by 4 inch stakes.	
Six pair 3 by 4 inch stakes.	
Six pair 4 by 5 inch stakes.	} Hemlock or similar wood.
Six pair 5-inch saplings.	
Nine pair 4 by 4 inch stakes.	
Twelve pair 3 by 4 inch stakes.	

*Substitutes for Each Pair of 3 by 2 Inch Hardwood Stakes.*

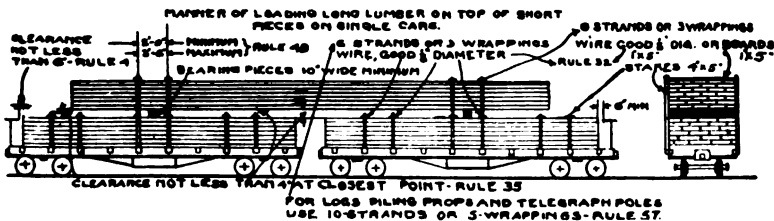
One pair 2½-inch saplings.	Hardwood.
One pair 4 by 2 inch stakes.	} Hemlock or similar wood.
One pair 3 inch saplings.	

LUMBER LOADED ON TOP OF SINGLE LOADS, AS IN FIG. 5.

35. Long pieces so loaded as per Fig. 5 must rest on bearing-pieces not less than ten (10) inches wide and of sufficient thickness to provide

FIG. 5.

SEE RULES 34, 35, 36, 37, 45 AND 53.



four (4) inches clearance at all points, securely fastened across the top of lading of each car, and stakes must be wired at bearing-pieces.

36. The STAKES must extend up as shown, and be held together at top with either wire or boards. (In accordance with Rule 34.) The short lumber must be placed centrally on each car, and the bearing-pieces must

be placed half-way between the stakes and as near the middle of the car as possible. Stakes must not be less than two (2) feet nor more than three (3) feet six (6) inches apart.

37. The MAXIMUM AGGREGATE WEIGHT must not exceed ninety (90) per cent of the capacity of the cars, and the amount of long lumber must not exceed one-half ( $\frac{1}{2}$ ) the lading.

#### LUMBER LOADED AS PER FIGS. 6 AND 7.

38. This material may be carried on one car, either in the manner shown in Fig. 6, when all the material is of nearly equal length, or as shown in Fig. 7, when part of the material is long and part of the material short; the second car in both instances being simply an idler.

FIG. 6.

SEE RULES 12 AND 13.

SEE RULES 17, 31, 32, 34, 35, 36, 43, 44, 45, 46 AND 48.

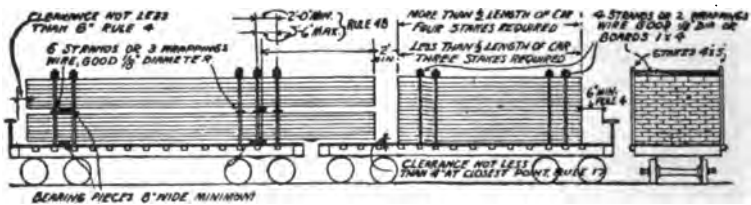
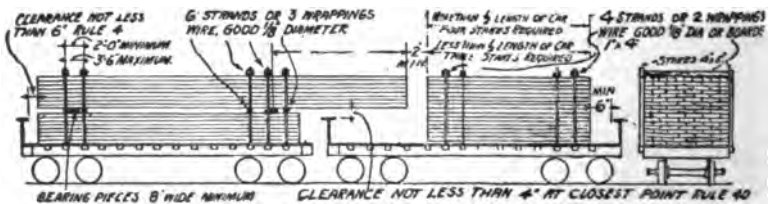


FIG. 7.

SEE RULES 12 AND 13.

SEE RULES 17, 31, 32, 34, 35, 36, 40, 42, 43, 44, 45, 46, 48 AND 53.



39. When the material is loaded in accordance with Fig. 6, the idler must invariably be a flat car while the car carrying the load may be either a flat car or a drop-end gondola car.

40. When the material is loaded as per Fig. 7, the IDLER may be a gondola car, provided there is a clearance of at least four (4) inches between the bottom side of overhanging material and the top of sides or brake shaft of the idler.

41. The material on carrying car, when loaded as per Fig. 6, must rest on bearing-pieces not less than eight (8) inches wide, and of sufficient

thickness to keep the ends of lumber at least four (4) inches above the floor of the idler, and in length equal to the full width of the car, to prevent the lading from touching the idler so that the cars can curve freely.

42. These BEARING-PIECES should be placed directly above the bolster, or as near to it as possible, but never between it and the end of the car. See also Rule No. 23. When the material is loaded as in Fig. 7, no extra bearing-pieces are required on the floor of the carrying car, as the short material loaded underneath the long material will take the place of the bearing-pieces.

43. The lading overhanging the idler, Figs. 6 and 7, must be governed by restrictions contained in General Rule No. 11, so that overhang will not exceed clearances in curving.

44. Short material may be loaded on the idler to the extent of two-thirds of its marked capacity.

45. The FIVE STAKES on each side of the carrying car should be placed as near the bolsters as possible, and no stakes whatever should be used on the idler to confine the overhanging part. The only stakes permitted on the idler will be such as may be required for the short lumber loaded on the idler. Where the pile of lumber on the idler exceeds 20 feet in length, four (4) stakes on each pile must be used, three (3) on each side being sufficient for shorter piles to conform to Rule No. 34. All stakes should be fastened as shown in Figs. 6 and 7 and as provided for in Rules 12, 13, 34, 35 and 36.

46. As the load on one truck of the carrying car is in excess of that on the other, and in direct proportion to the load on bearing-pieces and the overhang, care should be taken in all cases to load as near as possible to the brake staff of carrying car, but a clearance of not less than six (6) inches must be allowed between lading and brake wheel of carrying car, as per Rule No. 4. See Figs. 6 and 7.

#### LUMBER LOADED AS PER FIGS. 8, 9, 10 AND 11.

47. This material (of any length) may be loaded on two or more cars.

48. STAKES and bearing-pieces must be placed as indicated in the diagrams. Stakes must be wired at the center and fastened at the top with either boards or wire, in accordance with Rules 12, 13, 35 and 36. Stakes must not be less than two (2) feet nor more than three (3) feet six (6) inches apart.

49. BEARING-PIECES must not be less than ten (10) by ten (10) inches in section, and, if possible, should be placed at equal distances from the centers of bolsters on both carrying cars.

50. When necessary to make the width of lading less than width of car, on account of long overhang or distance between bearing-pieces,

FIG. 8.

**SEE RULES 12 AND 13.**

**SEE RULES 17, 34, 35, 36, 47 AND 48.**

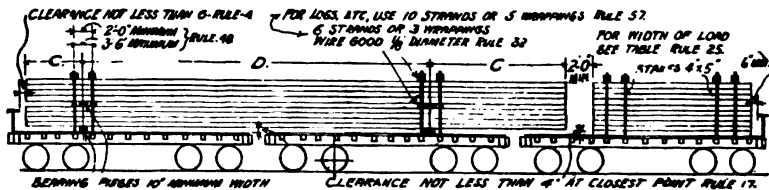


FIG. 9.

**SEE RULES 12 AND 13.**

**SEE RULES 17, 35, 36, 47 AND 48.**

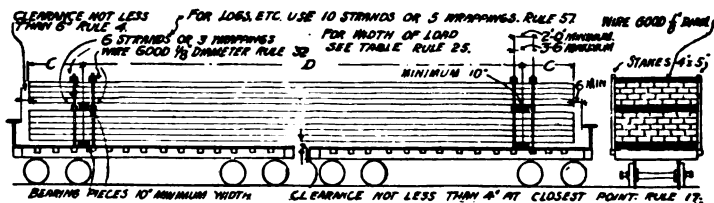


FIG. 10.

**SEE RULES 12 AND 13.**

**SEE RULES 17, 31, 35, 36, 47 AND 48.**

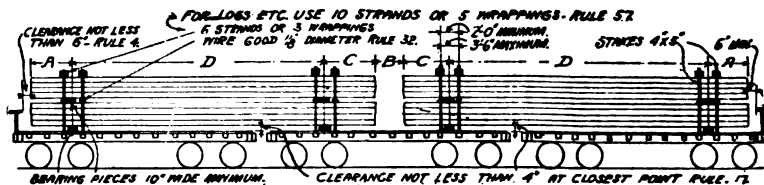
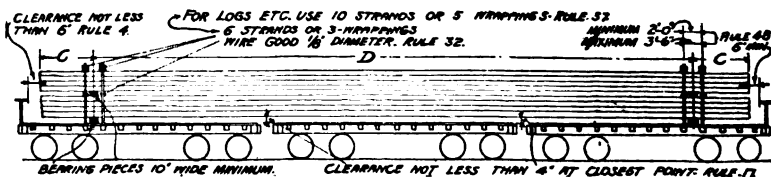


FIG. 11.

**SEE RULES 12 AND 13.**

SEE RULES 17, 31, 35, 36, 47 AND 48.



FILLING-PIECES must be placed between the stakes and lading and securely fastened to inside of stakes. See Fig. 13.

# LUMBER ON GONDOLA CARS AS PER FIGS. 12 AND 13.

51. Long material may be LOADED ON GONDOLA CARS that have drop-end gates, provided that when loaded on two cars, BEARING-PIECES of sufficient thickness are used to keep the load clear of the end gates and floor by at least four (4) inches, and in addition to the bearing-pieces on the floor there is a clearance at each side of load of at least eighteen (18)

FIG. 12.

SEE RULES 12 AND 13.

SEE RULES 35, 36, 48, 51 AND 51.

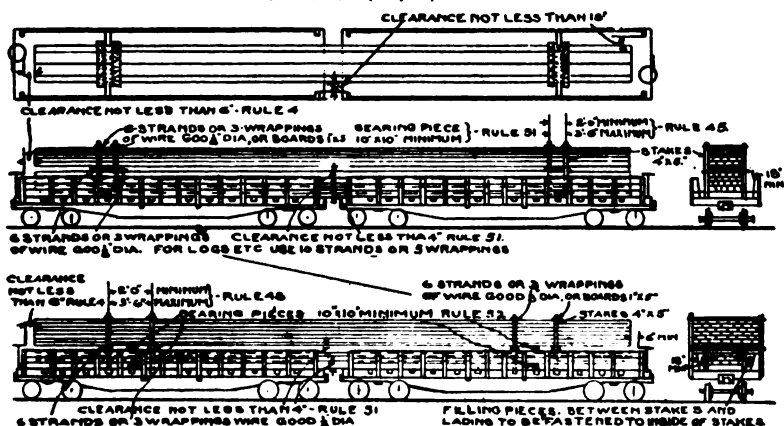


FIG. 13.

SEE RULES 12 AND 13.

SEE RULES 35, 36, 48, 51 AND 52.

inches between the load and the car side and end-gate stops at narrowest point to provide for curving, as shown in Fig. 12. This clearance may be obtained by the use of stanchions, not less than four (4) by five (5) inches in section, placed in a vertical position, and securely fastened by cleats to the floor bearing-pieces in such a manner as to make the floor bearing-pieces serve as a brace between them, and to be fastened together with wire at center and either boards or wire at top, as specified in Rules 12, 13, 35 and 36. Not more than two gondola cars must be used together.

52. If the load projects above the sides of car, bearing-pieces not less than ten (10) by ten (10) inches, properly cleated on the inside of sides,

must be placed on car sides, and securely braced to prevent both longitudinal and lateral motion. See Fig. 13. The material placed on these bearing-pieces may be loaded to the full width of car. Stakes must be placed as shown in Fig. 13, and must be wired above car sides and again at top.

FIG. 12A.

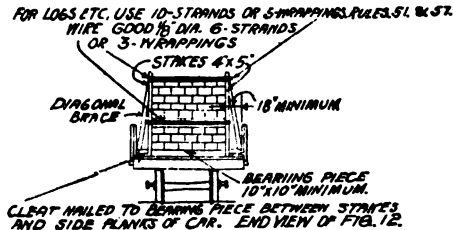
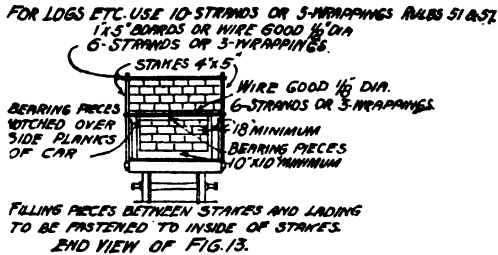


FIG. 13A.



## RULES GOVERNING THE LOADING OF DRESSED LUMBER.

53. If the lading consists of dressed lumber, and the shippers desire to do so in order to prevent sap stains, strips of rough lumber not more than two (2) inches nor less than one (1) inch thick, by not more than six (6) inches nor less than four (4) inches wide, may be placed crosswise between each layer of lumber. All strips over one and three-eighths ( $1\frac{3}{8}$ ) inches thick must be six (6) inches wide. There must be one cross-piece to each pair of stakes on opposite sides of the car and between each layer of lumber. These strips must be of the same thickness for each layer of lumber, and must be neatly fitted between and butt against the stakes. When loaded as per Figs. 4, 5 and 7, the strips may be placed on the floor of the car as well as between the layers.

# RULES GOVERNING THE LOADING OF LOGS, TELEGRAPH AND TELEPHONE POLES, PILING AND PROPS ON OPEN CARS.

54. Material of this description must be loaded with the BUTTS AND TOPS ALTERNATING.

If the lading rests on two or more cars, it must rest on BEARING-PIECES not less than ten (10) by ten (10) inches in section.

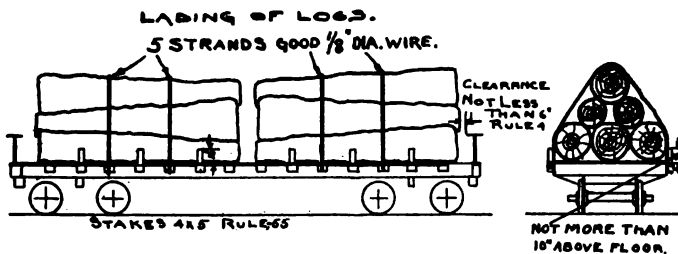
## Logs.

55. Logs twenty (20) inches or over in diameter must be loaded in pyramidal form with the largest logs at the bottom, as shown in Fig. 14, with the large ends of the first course toward the end of car. There must not be less than three (3) pairs of stakes of hardwood or live saplings, square on end, to completely fill the stake pockets. Stakes must be four (4) inches by five (5) inches in section, accurately fitted to the stake pockets, and to extend not more than ten (10) inches above the car floor. For long logs there must be one pair of stakes for each length of five (5) feet or fraction thereof. The logs must be bound by means of five (5) strands of good  $\frac{1}{8}$ -inch diameter wire, passing over top of lading and fastened to stake pockets. There must be at least two such ties for each tier. See Fig. 14.

NOTE.—Logs loaded in accordance with Fig. 14, secured by means of permanent short stakes and chain in lieu of the specified staking and wiring, will be acceptable.

FIG. 14.

RULE 55.



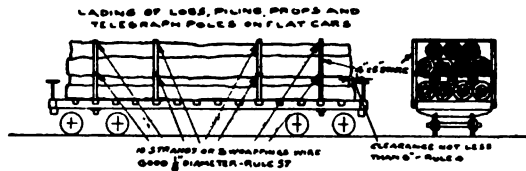
LOGS, PILING, PROPS, TELEGRAPH AND TELEPHONE POLES.

56. When material of this kind is loaded on flat or gondola cars with sides less than 30 inches high, and lading does not exceed 4 feet in height measured from floor, and the lading is not loaded in pyramidal form, the stakes must be as high as the lading and must be tied together

at the top with not less than eight strands equal to four wrappings of good  $\frac{1}{8}$ -inch diameter wire and must be tight. Stakes must be sound hardwood, free from knots and of the dimensions specified in General Rule No. 12.

57. If the material is loaded on flat cars or gondola cars with sides less than 30 inches high, to a height more than 4 feet measured from floor, opposite stakes must be bound together with wire at about one-third of the height above car floor after one-third of the load has been placed on the car, and in such a manner that when the remaining load is placed on the car the wire will have a tendency to draw the tops of the stakes toward each other. The middle as well as the top wrapping of wire must consist of not less than ten strands equal to five wrappings of good  $\frac{1}{8}$ -inch diameter wire and must be tight. Bearing-pieces may be placed between the lower and upper sections of load to facilitate application of wire after all the lading has been placed on the car. See Fig. 15. Stakes

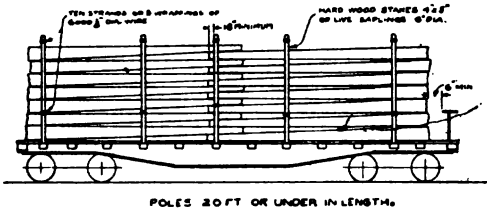
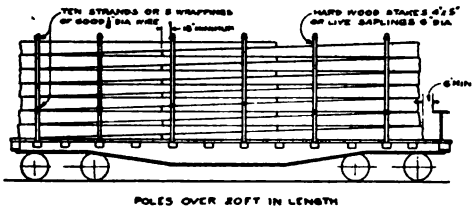
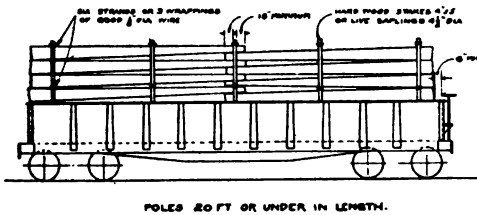
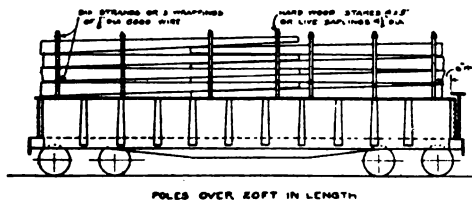
FIG. 15.  
RULE 57



must be sound hardwood free from knots and of the dimensions specified in General Rule No. 12. Stakes must incline toward center of car a total of about 12 inches before load is placed on car, and in no case will they be allowed to incline away from center of car after the car is loaded. The inspector must assure himself that all wiring is tight before load is moved.

58. When lading is placed inside of a single gondola car with sides 30 inches high or over and load projects above car sides, not less than three pair 4 by 4 hardwood stakes or three pair of  $4\frac{1}{2}$ -inch live saplings should be well secured to either side of lading on inside of car for piling or props 20 feet or less in length. Four stakes of the same size should be used on each side of load over 20 feet and less than the length of the car. If the length of lading is greater than the length of car five stakes should be used on each side. Stakes must be wired at top with six strands, equal to three wrappings of good  $\frac{1}{8}$ -inch diameter wire. If the lading extends more than 3 feet above top of car sides, the intermediate wire must be used and drawn sufficiently to pull the stakes inwardly when final load is placed thereon.

When lading is in two piles not over 20 feet in length and ends of piles are interlaced at center of car as per Figs. 15-A and 15-C, there must be not less than five pairs of stakes for total length of load. If the length exceeds 20 feet as per Figs. 15-B and 15-D, there must be not less than six

FIG. 15A  
RULE 58FIG. 15B  
RULE 58FIG. 15C  
RULE 58FIG. 15D  
RULE 58

pairs of stakes for total length of load. The ends of poles must extend not less than 18 inches beyond the center stake.

59. Logs, piling and telegraph poles loaded as a single overhanging load or on two or more cars should conform to Figs. 5, 6, 7, 8, 9, 10, 11,

12 and 13, and Rules 35, 36, 37, 38, 39, 48, 49, 50, 51, 52 and 58. If lading is less than four (4) feet high Rule 56 should be followed, and when more than four (4) feet high Rule 57 should be followed. The wiring of stakes should conform to Rule 57 for flat cars and Rule 58 for gondola cars.

## THE LOADING OF TAN BARK.

### FOR LOADS ON FLAT CARS.

60. When tan bark is loaded on flat cars there must be four stakes properly fastened at each end of car.

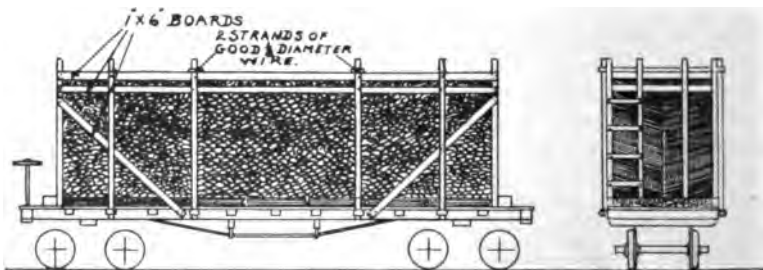
There must be at least four stakes at each side of car, accurately fitted to stake pockets. Rule 34, Section B, to govern size and kind of stakes. Two pairs of side stakes, those nearest center of car, must be fastened across the top by means of wire. The wiring should not be of less than two strands of good  $\frac{1}{8}$ -inch diameter wire per pair of stakes, twisted sufficiently to hold stakes in a vertical position.

Two boards not less than one (1) inch by six (6) inches in section, spaced four (4) inches apart, or one board one (1) inch by twelve (12) inches in section, must be securely nailed to inside of end and side stakes. See Fig. 16.

**FIG. 16.**

*FOR SIZE OF STAKES SEE RULE 34, SEC. B.*

### LADING OF TAN BARK ON FLAT CARS.



*BEARING PIECE ALONG OUTSIDE EDGE 4\"/>*

The load must extend to, but not beyond the top line of the top board at time of loading.

Diagonal braces not less than one (1) inch by six (6) inches in section must be nailed to outside of car frame, or car sides, to outside of top boards and to inside of second stake from end of car, with not less than

three ten-penny wire nails. At diagonally opposite corners of car, boards not less than one (1) inch by four (4) inches in section, spaced not more than two (2) feet apart, must be securely nailed to the inside of corner stake and the stake next to it, the top board to be not more than two (2) feet below the top of lading, in order to provide proper foothold.

In loading, strips should be arranged vertically inside of the cross boards, or bark set on end so as to permit space for foothold and handhold at the cross-pieces. Fig. 16.

#### FOR LOADS ON GONDOLA CARS.

61. Where tan bark is loaded on gondola cars there must be at least four stakes properly fastened at each end of car, and sufficient side stakes on side of car so that the spacing between stakes or between stakes and end of car does not exceed twelve (12) feet. Rule 34, Section B, to govern size and kind of stakes. Two boards not less than one (1) inch by six (6) inches in section spaced four (4) inches apart, or one board one (1) inch by twelve (12) inches in section should be securely nailed to inside of the end and side stakes about twelve (12) inches below top of stakes. See Fig. 17.

FIG. 17.

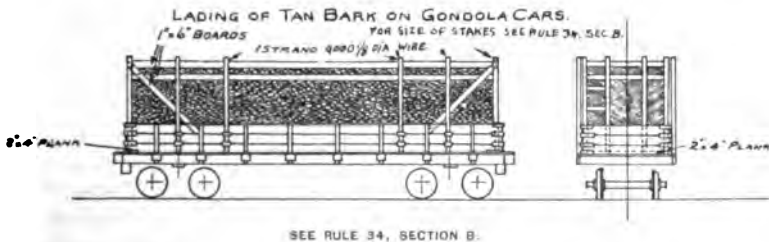
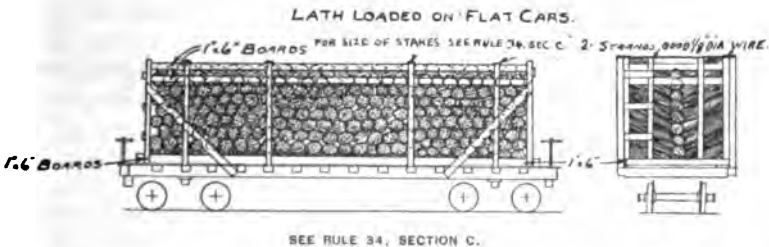


FIG. 17-A.



62. Gondola cars with sides less than thirty (30) inches high should be governed by the same rules as for flat cars.

63. Gondola cars, with sides thirty (30) inches high, must have end

stakes secured at bottom by nailing a plank two (2) inches by four (4) inches in section to floor inside of bottom of stakes. Cars equipped with stakes so secured may be loaded to nine (9) feet above floor. If the load exceeds nine (9) feet in height, the tops of opposite stakes must be connected by wire or boards. For such lading the wire must consist of at least one strand of good  $\frac{1}{8}$ -inch diameter wire.

64. Gondola cars with sides more than thirty (30) inches high may be loaded to a height of nine (9) feet above floor without the use of plank nailed to the floor.

65. It will be the duty of the inspector to carefully examine the load to note that the bark is interlaced and sufficiently secured to make the lading safe for transit.

#### THE LOADING OF SLAB WOOD.

66. Open cars loaded with slab wood will not be accepted (unless otherwise agreed) if the same instructions as given in Rules 60 and 65 for loading tan-bark have not been complied with, precaution being taken to see that the ends and side boards are high enough to prevent slabs from sliding off the car.

66A. General instructions given for tan-bark should govern the loading of lath, but, in addition, these rules should be followed:

Boards one (1) inch by six (6) inches in section, placed on edge, and fastened inside of side and end stakes, should be placed immediately above floor of car, to prevent the bottom layers of lath from shifting endwise or sidewise.

Immediately inside of lower course of side boards bundles of lath should be laid longitudinally, and a longitudinal row of bundles should be placed along center of car. Bundles should then be laid crosswise, butting against center longitudinal row, and resting on top of side longitudinal rows. Succeeding courses should be laid crosswise in the same manner, butting against additional longitudinal rows laid between them over center line of car. Opposite stakes must then be fastened together with either boards or wire, in the same manner as required for tan-bark. At diagonally opposite corners boards should be applied, to provide proper foothold and handhold, as required for tan-bark, except that these boards may be nailed to outside instead of inside of stakes, as required when loading tan-bark.

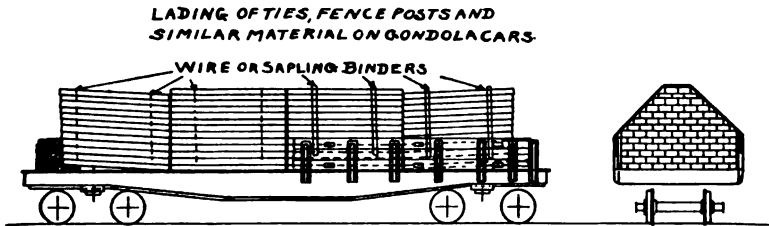
# **RULES GOVERNING THE LOADING OF TIES, FENCE POSTS AND SIMILAR LADINGS ON OPEN CARS.**

**SHOWN IN FIG. 18.**

67. Flat cars loaded with cross ties or fence posts and similar short material will not be accepted for shipment, unless otherwise agreed.

**FIG. 18.**

**RULE 68.**



68. Gondola cars will be accepted with loads not to exceed 4 feet above the end gate of car. If the load is built up in pyramidal form above sides of car, each tier must be loaded flatwise above end gate so as not to wedge or spread the sides. Lading must not extend over the sides of car and must be wired as provided for in Fig. 18.

69. If the load extends more than 12 inches above end or end gate at center, each pile must be tied across top by at least two binders. Each binder is to be fastened to each tie in passing over the load. See Rules 70 and 71 for manner of securing binders.

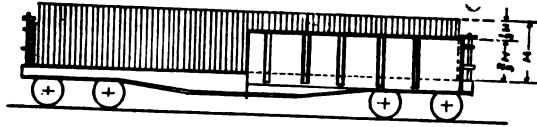
69A. As an alternate method of loading in gondola cars, ties, fence posts, cord wood and similar material may be loaded vertically, or inclined, provided the height of load is not more than one and one-half times the height of car sides, measured from floor to top of load (see Figs. 18-A and 18-B). When the inside width of car is less or greater than the length of the material to be loaded, and such a method is preferred, the load can be built up as shown in Figs. 18-C and 18-D.

70. When wire is used it must not be less than good  $\frac{1}{8}$ -inch diameter, and but one strand may be used, the wire to be secured to the side of car with at least three (3) nails or staples, or to stake pockets, or through holes in top of flange on side of steel cars, or fastened to outside edge of first tie projecting above car side.

71. When SAPLING is used it must be of green timber, split, and not less than one and one-half ( $1\frac{1}{2}$ ) inches wide on the split or flat side. The ends of the sapling must extend at least twelve (12) inches below car side and be securely fastened to each tie with nails in passing over the load.

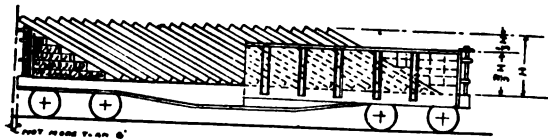
**FIG 18-A**  
RULE 67-A

LOADING OF SHORT PIECES NOT MORE THAN 9' 0" LONG  
SUCH AS TIES FENCE POSTS CORD WOOD, ETC IN  
GONDOLA CARS



PIECES LOADED VERTICALLY IF THE LENGTH IS NOT  
MORE THAN ONE AND ONE HALF TIMES INSIDE HEIGHT  
OF CAR SIDES

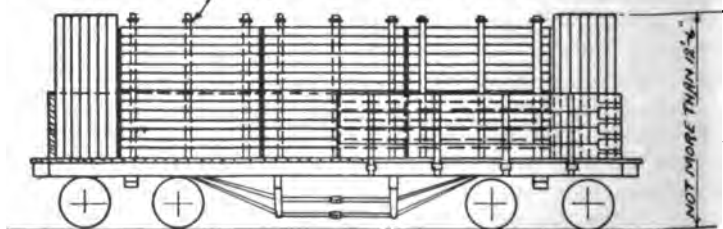
**FIG 18-B**  
RULE 67-A



PIECES MUST BE INCLINED IF THE LENGTH IS MORE THAN  
ONE AND ONE HALF TIMES THE INSIDE HEIGHT OF  
CAR SIDES

**FIG 18-C.**  
RULE 69-A

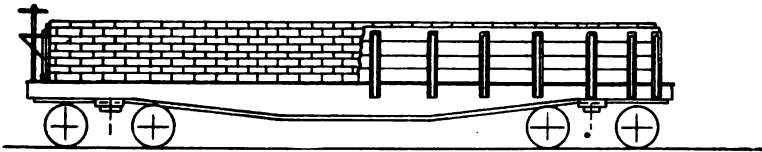
4-STRANDS OF GOOD  $\frac{1}{8}$ " DIA. WIRE ON EACH PAIR OF STAKES.



WHEN INSIDE WIDTH OF CAR IS LESS THAN LENGTH OF  
PIECES TO BE LOADED, END BLOCKING AND STAKES  
MAY CONSIST OF PIECES PLACED VERTICALLY.

**FIG 18-D.**

**LOADING OF TIES, FENCEPOSTS, ETC. IN GONDOLA CARS.  
RULE 69-A.**



**WHEN INSIDE WIDTH OF CAR IS GREATER THAN LENGTH OF PIECES,  
LOADING MAY BE PLACED TRANSVERSELY.**

**RULES GOVERNING THE LOADING OF LONG STRUCTURAL  
MATERIAL, PLATES, RAILS, GIRDERS, ETC., ON OPEN  
CARS. DETAIL INSTRUCTIONS.**

**LOADS ON SINGLE CARS.**

72. Large girders loaded on flat side on flat cars must always be carried upon bearing blocks not less than six (6) inches by twelve (12) inches in section, bolted to the car floor with  $\frac{7}{8}$ -inch bolts. Bearing blocks must be placed near each bolster and not more than eighteen (18) inches from center line of bolster. Two (2) inch by four (4) inch by eighteen (18) inch cleats must be placed longitudinally under the floor and must be secured by means of bolts with cut washers under bolt heads and nuts. Spacing blocks not less than two (2) inches by twelve (12) inches in section must be placed between consecutive girders. Lateral motion must be prevented by fitting planks between the flanges of the girders as shown in Fig. 22. Girders may be clamped together as shown in Fig. 21. When so loaded, the blocking used must not be less than three (3) inches by eight (8) inches in section for bearing blocks on car floor, two (2) inches by eight (8) inches in section for spacing blocks and four (4) inches by six (6) inches in section (hardwood) for top tie planks. The vertical rods must not be less than one (1) inch in diameter, and must, if possible, pass through the blocking and floor of car. With loads twenty-four (24) inches high or over, braces must be added as shown in Fig. 46. If rivet holes are not available, longitudinal motion must be prevented by using clamps. See Fig. 21.

FIG. 19.

**FIG. 21.**

**LARGE GIRDERS LOADED FLAT.**

FIG. 22.

73. Large girders, loaded as shown in Fig. 23, must be SECURED TO CARRYING CAR, as described in paragraph 72 and Fig. 21.

**FIG. 23.**

**RULES 11, 78 AND 77.**

**LAPING OF LARGE GIRDER OVERHANGING**

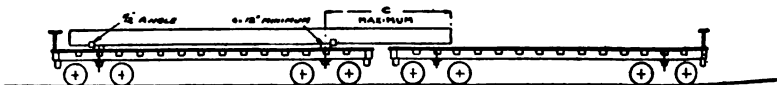
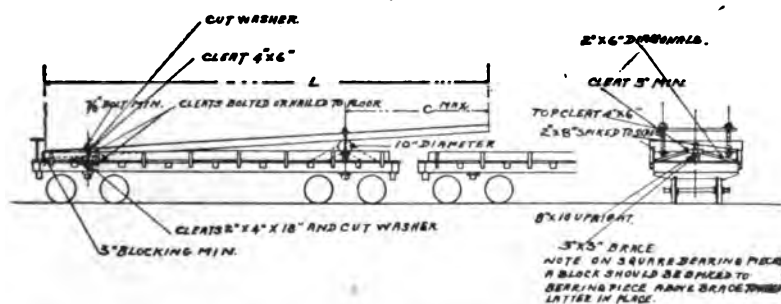
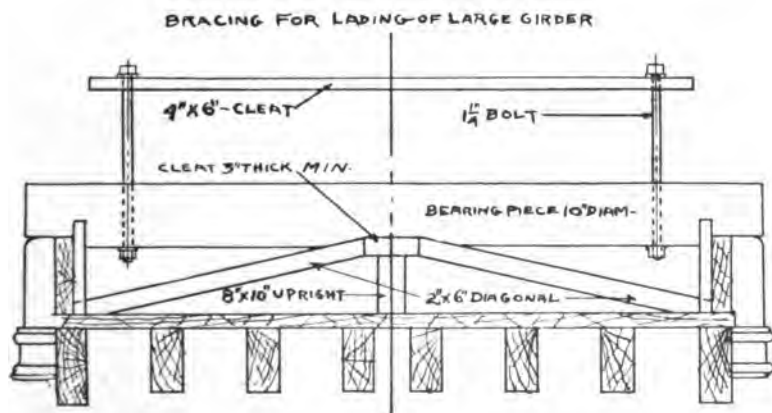


FIG. 24.  
RULES 4-75-77.

74. When loading short structural material on single gondola cars, in separate piles, as shown in Fig. 27, the pieces forming each pile must be lapped, and must be blocked to solidly fill the whole space between sides of car. Lading projecting above car sides must be placed in pyramidal shape, and opposite stakes must be fastened together at top by means of boards. Diagonal braces must be placed close to sloping sides of lading,

FIG. 25



and fastened at each side of each stake and tie boards by not less than three sixteen-penny nails. See Fig. 28. For piles up to twenty (20) feet long, at least three pairs of stakes, and for longer piles four pairs of stakes, must be used. See Figs. 27 and 28.

In place of intermediate stakes, when either 3 or 4 stakes are used on each side of a pile, it will be permissible to substitute for each pair of stakes one clamp, consisting of 4 inch by 6 inch top piece and two tie rods,

not less than 1 inch in diameter, secured through floor in the usual manner, or to stake pocket, by means of metal plate washer or substitute, the ends of rods to be riveted over nuts after the clamp has been drawn tight.

FIG. 27.

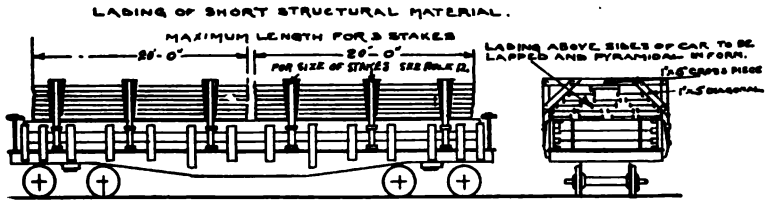
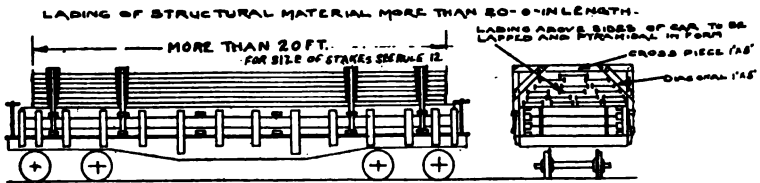


FIG. 28.



74-A. Small steel plates and similar material loaded in box, stock or gondola cars, the load should be uniformly distributed over the car floor. In no case should the amount of load placed between the body bolsters and either end of car exceed 15 per cent of the capacity of cars with wood underframing and 20 per cent of the capacity of cars with steel underframing.

FIG. 29.

**MANNER OF LOADING LIGHT STRUCTURAL MATERIAL  
ON SINGLE GONDOLA CARS.  
FOR SIZE OF STAKES SEE RULE NO. 12.**

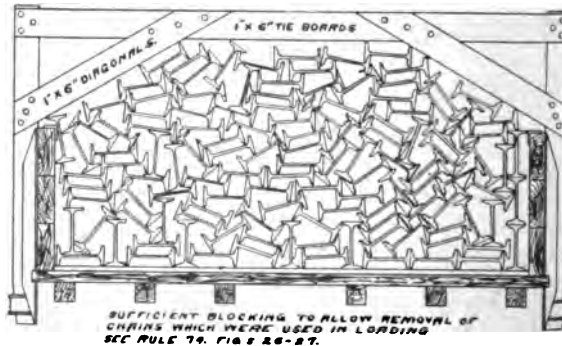


FIG. 30.

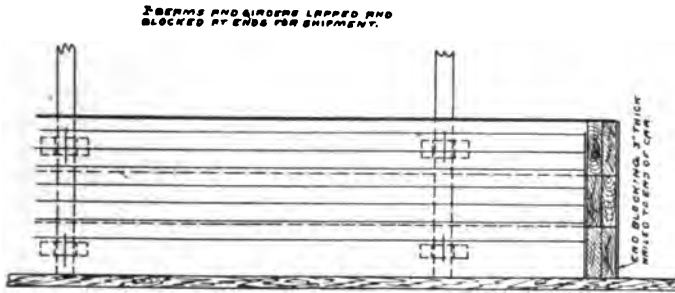
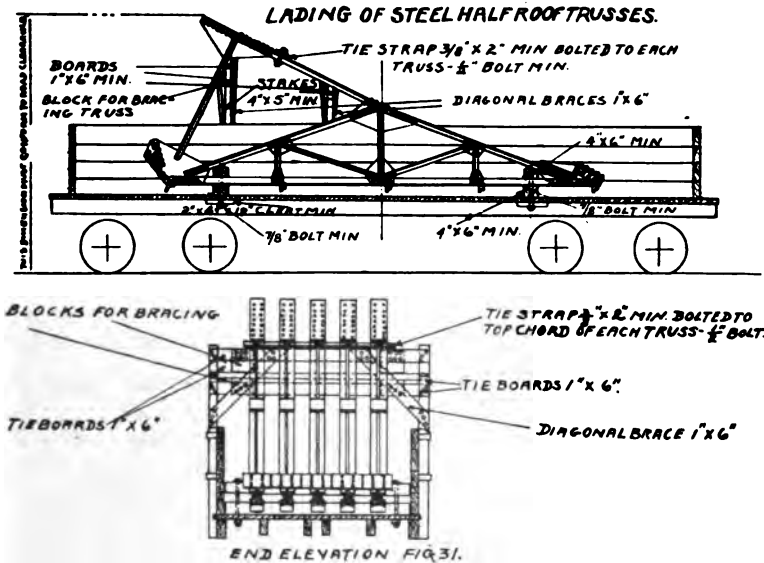


FIG. 31.



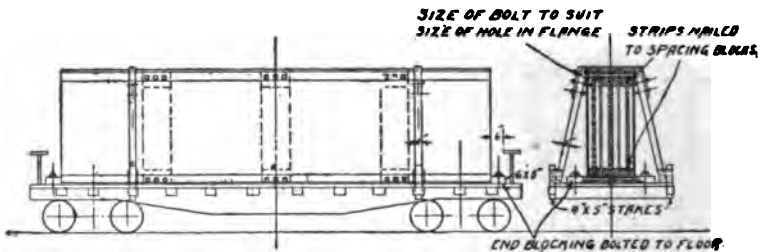
75. Open girders, half-roof trusses, and similar material loaded on gondola cars, as shown in Fig. 31, must rest on two bearing-pieces not less than six (6) inches wide and four (4) inches thick. Two other timbers of same size must be placed above lower chord of trusses or girders, and securely bolted through bearing-pieces, floor and longitudinal cleat under floor. Load must be secured from shifting transversely by two stakes on each side, and opposite stakes fastened together by means of tie boards passing under and touching top chords of trusses or girders. Two blocks about a foot in length and of sufficient height to block outside girders must

be securely nailed with not less than six ten-penny wire nails, between tie boards against outside girders. Diagonal braces must be fastened to stakes and cross-tie boards.

#### RULE 75-A.

Deep girders, whenever possible, should be loaded horizontally. Girders having a depth of more than two and one-half ( $2\frac{1}{2}$ ) times the base, if loaded vertically, must be blocked apart to prevent overlapping of flanges and tied together to prevent independent side motion. See Fig. 31-A. This tying should be sufficiently strong and secure to practically combine all the girders so that they must act as one piece. In addition the load must be carefully blocked to prevent shifting sidewise or endwise.

FIG. 31-A  
MANNER OF LOADING DEEP GIRDERS ON FLAT CARS.  
RULE 75-A.



WHEN LOADED IN GONDOLA CARS, AS SHOWN IN FIG. 24 AND FIG. 33-A.

76. One end must rest on bearing-piece not less than eight (8) inches wide and of sufficient depth to prevent lading at end of car from touching floor; the bearing-piece to be placed on the floor above the bolster and extending the width of car, and must be secured from shifting by cleats nailed or bolted to the floor. The end boards at this end of the car must be protected by blocking fitted between the side boards so as to prevent any part of the load from injuring the end boards of the car. The thickness of the blocking may vary according to the weight of the lading, but should never consist of less than one three (3) inch plank set on edge for loads of less than one-half the capacity, nor less than two three (3) inch planks or their equivalent for loads of more than one-half ( $\frac{1}{2}$ ) of the capacity of the car, and must be secured from shifting by cleats nailed or bolted to the floor.

77. If the OVERHANG (C) exceeds one-third ( $\frac{1}{3}$ ) the total length (L) of load, as per Figs. 23 and 24, the opposite end must be securely bolted through bearing-piece to floor by means of seven-eighths ( $\frac{7}{8}$ ) inch bolts.

78. If the DEPTH OF LOAD IS MORE THAN TWENTY-FOUR (24) INCHES,

THE BRACING for clamping-piece on top of sides of car must be the same as shown in Fig. 46.

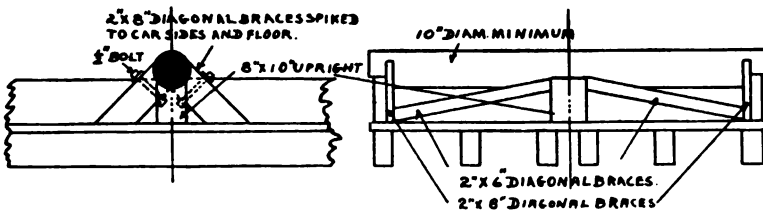
79. If the lading which butts against the end boards consists of only a single piece or two of a weight not exceeding a total of six thousand (6,000) pounds, no end blocking is required.

80. When the lading consists of very FLEXIBLE MATERIAL, such as plates, no bearing-piece is required on the floor of the car, but blocking must be used to protect the end boards.

The other end of the load must rest upon a bearing-piece, square or round, preferably square, not less than eight (8) by ten (10) inches if square cornered, nor less than ten (10) inches in diameter if round, for loads of over one-half ( $\frac{1}{2}$ ) the capacity, and proportionately smaller to less weight of lading. This bearing-piece must rest on the side boards of the car, within one (1) foot of either side of the center line of the bolster,

FIG 32.  
RULES 7 AND 81.

MANNER OF BLOCKING ROUND BEARING PIECES.  
LOW SIDE GONDOLA CARS WITH SIDES 3" OR MORE IN THICKNESS.



and must have the ends notched for the side boards and be securely braced to prevent both lateral and longitudinal motion, as well as bending and rolling. Figs. 32 and 33 show substantially how both bearing-pieces are to be made and secured.

81. If the total weight per bolster, Figs. 32 and 33, does not exceed 10,000 pounds, the center post and bolster cross braces may be omitted, provided the bearing-piece is not less than eight by ten inches (8 x 10 inches).

81-A. For twin loads of plates, structural bars and shapes with two bearing-pieces and two or four sliding-pieces, if the total weight does not exceed 20,000 pounds, or 10,000 pounds per bearing-piece, the center post and bolster cross braces may be omitted, provided the bearing pieces are not less than eight by ten inches (8 x 10 inches).

81-B. For loads less in weight than those specified in paragraphs A and B, the dimensions of bearing pieces may be proportionally reduced as per Rule No. 29.

81-C. Plates too wide to be loaded flatwise in gondola cars may be loaded flat on flat cars, the load being held in place by 2 by 4 inch straight

FIG 33.

RULES 7 AND 81.

## MANNER OF BLOCKING RECTANGULAR BEARING PIECES.

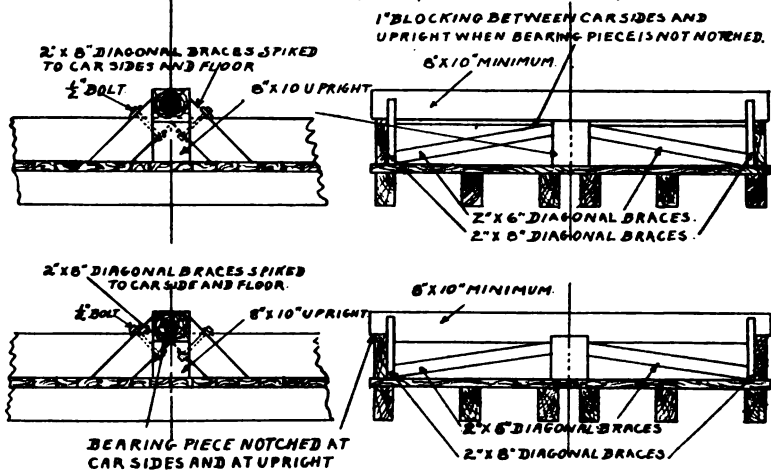
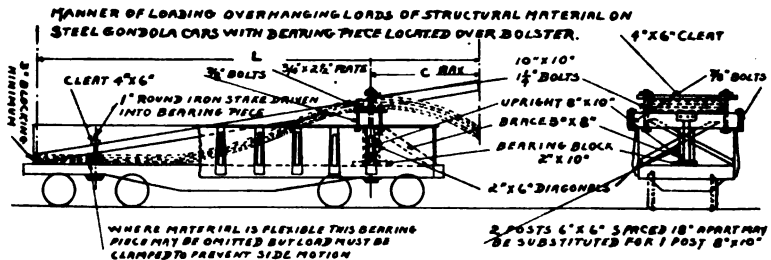


FIG 33-A



grain hardwood clamps, not less than six (6) feet apart, extending across car, substantially secured by  $\frac{7}{8}$ -inch bolts passing through the stake pockets. The plates must be so loaded that the  $\frac{7}{8}$ -inch bolts can be passed through stake pockets without being bent. This manner of loading is permissible only when the width of plates will not permit the use of standard stakes.

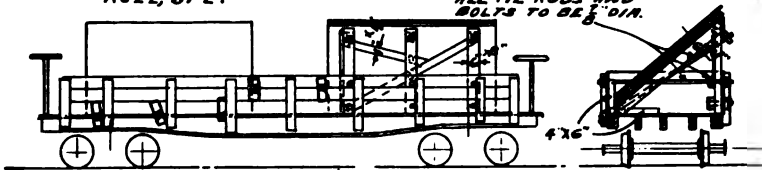
81-D. Plates too wide to be loaded flat on gondola or flat cars may be loaded diagonally on wooden gondola cars, one side of the load resting on two bearing-pieces securely fastened to the car floor; on the same side of car two (2) straight grain hardwood pieces 4 by 6 inches to be securely fastened to car side, the other side supported by three (3) vertical straight grain hardwood posts 6 by 8 inches in section of sufficient height that when plates are placed diagonally across the car they will extend from one side across to full width of upright posts. These posts

to be securely bolted to side of car with two (2)  $\frac{3}{8}$ -inch bolts, also secured by one diagonal rod not less than  $\frac{3}{4}$  inch in diameter passing through each post within 8 inches of top and through opposite side of car 4 inches above car floor, and tied together with 1 by 4 inch hardwood boards, nailed to each vertical post with not less than three (3) ten-penny nails. If the load is made up of two (2) tiers, one on each end of car, the total load must not exceed 75 per cent of the marked capacity of car. If the plates are too long to be loaded in two tiers, they may be loaded at the center of the car in one tier, the load not to exceed 50 per cent of the marked capacity of car. Fig. 33-B shows substantially how bearing-pieces and braces are to be made and secured.

FIG. 33-B.

LOADING WIDE STEEL PLATES IN GONDOLA CARS.  
RULE, 81-E.

NOTE: ALL TIE RODS AND BOLTS TO BE  $\frac{1}{2}$ " DIA.



82. If the OVERHANGING MATERIAL is very FLEXIBLE and interferes with the end boards of the adjacent car, a suitable bearing-piece protected by a strip of iron must be placed on the adjacent car to support the material.

Where the overhang is flexible material and the weight not excessive, a 6 by 8 inch post of sufficient length may be bolted to inside of end of car to support overhang in lieu of sliding-pieces placed on adjacent car.

83. The IDLERS used with loads as shown in Fig. 23 must be flat cars, unless the width of the overhanging load is at least three (3) feet six (6) inches less than the width given for each length of overhang in the table of paragraph 11, in which case a drop-end gondola car may be used.

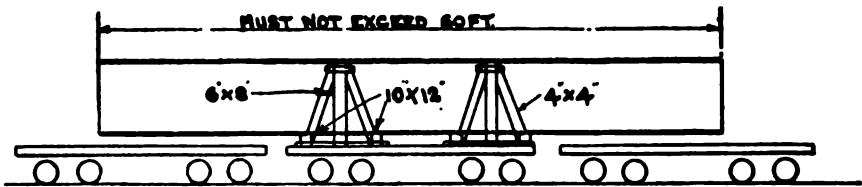
84. The IDLER used with loads as shown in Fig. 24 may be a low-side gondola car, but must have at least four (4) inches clearance vertically between load and idler body or brake shaft.

#### LOADS ON SINGLE CARS, OVERHANGING BOTH ENDS OF CAR AS PER

FIGS. 34, 35 AND 36.

85. This method of loading as shown by Figs. 34, 35 and 36, may be made use of to load long lattice girders, box girders, columns, one-half roof trusses, and similar material, in length not to exceed 65 feet, overhang not to exceed 16 feet, height and width to conform to Rule 25, if the material would be injured if loaded on more than one car. From a point of safety in transit, it is a very undesirable method and should be used only when absolutely necessary.

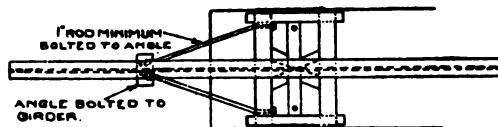
FIG. 34.



**Manner of Loading Lattice Girders.**  
**Rule 85 to be used only when absolutely necessary.**

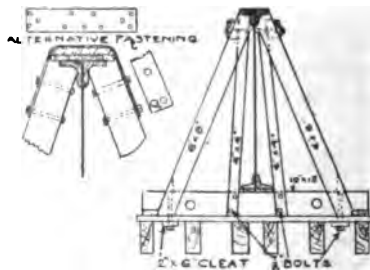
86. For loads of this character **FOUR BEARING-PIECES** must be placed in pairs on the carrying car, each pair being placed centrally above the bolster, with a distance apart of not over five (5) feet nor less than three (3) feet; they must be fastened to the floor with bolts, and the upright supports must have side braces.

**FIG. 35.**  
**RULES 72, 85, 86, 87 AND FIG. 34.**



87. Braces or tie-rods must be secured to the over-hanging ends and to the bearing-pieces, as shown in Fig. 35. Longitudinal motion must be prevented by the use of plates or clamps, as explained in paragraph 72.

**FIG. 36.**  
**RULES 72, 85, 86, 87 AND FIG. 34.**



**LOADING FLEXIBLE PLATES ON SINGLE CARS.**

88. Omitted in 1905.

89. When plates are loaded on single cars, except all steel and steel underframe designs, and the lengths of the plates are such that it becomes

FIG. 37.

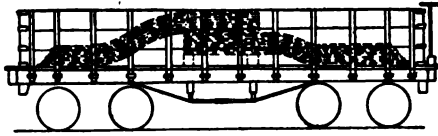
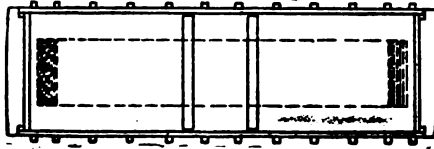


FIG. 38.



PLAIN VIEW OF FIG. 37.

necessary to lap the plates on each other at the center of the car they must be braced to prevent shifting sidewise, and bearing-pieces not less than six (6) by eight (8) inches in section and in length corresponding to the distance between the sides, must be placed on the floor of the car above the cross-bearers to prevent the breaking down of center sills and stringers, as shown in Figs. 37 and 38. Substantial blocking should be placed across end of car at end of load, to save end of car being cut by plates shifting endwise. Wooden underframe cars with two truss rods must not be loaded in this manner.

#### TWIN LOADS.

90. Material loaded on gondola cars with drop ends or on flat cars, as shown in Figs. 39 and 41, must have one bearing-piece not less than 10 by 10 inches (see also Rule 29) secured to the floor of each car

FIG. 39.

LADING OF LONG MATERIAL ON FLAT OR DROP END GONDOLACARS

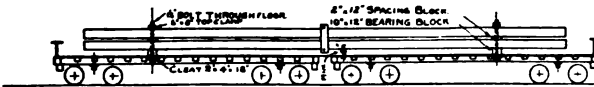


FIG. 40.

LADING OF LONG MATERIAL ON GONDOLACARS.

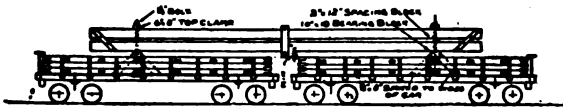


FIG. 41.

LADING OF LONG FLEXIBLE MATERIAL ON FLAT OR DROP END GONDOLACARS



FIG. 42.

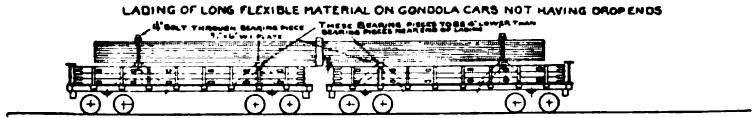
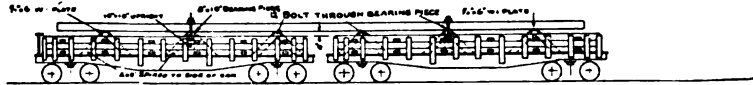
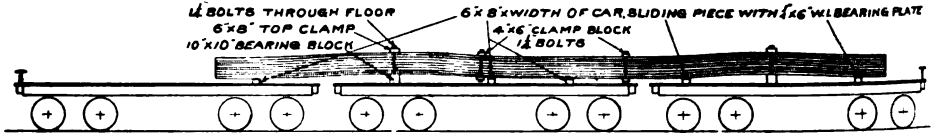


FIG. 43

LADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS NOT HAVING DROP ENDS

FIG. 43-A  
RULE 93

LOADING OF LONG FLEXIBLE MATERIAL ON FLAT CARS.

FIG. 43-B  
RULE 93

LOADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS.

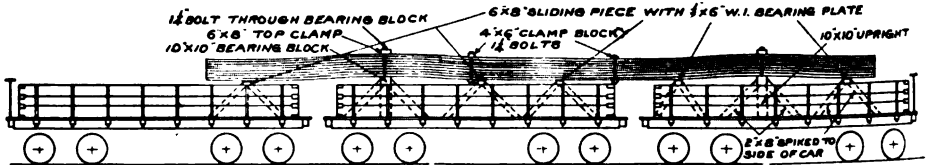


FIG. 44.

RULES 7 AND 92.

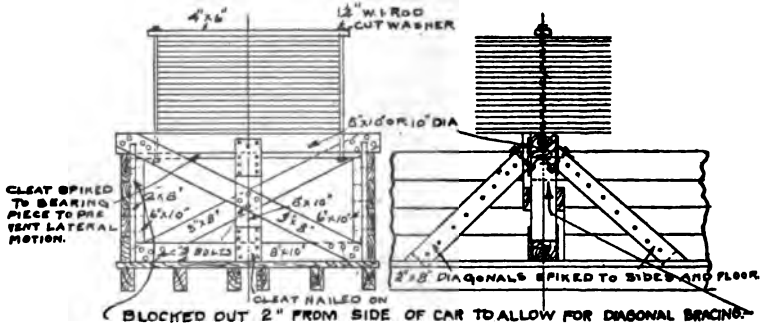
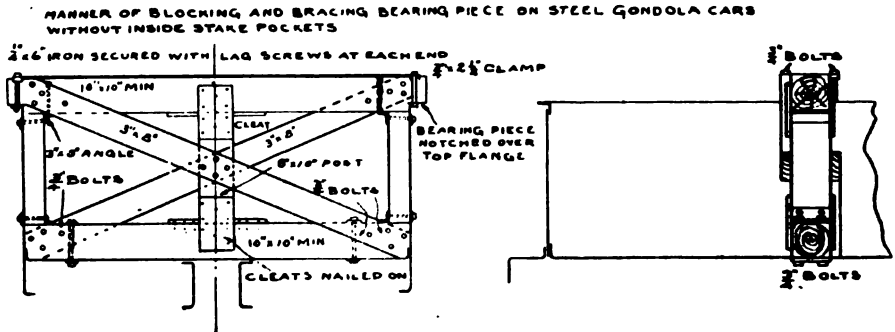
TWIN SHIPMENTS ON GONDOLA CARS NOT EQUIPPED WITH DROP ENDS  
AND HAVING SIDES LESS THAN THREE INCHES THICK.

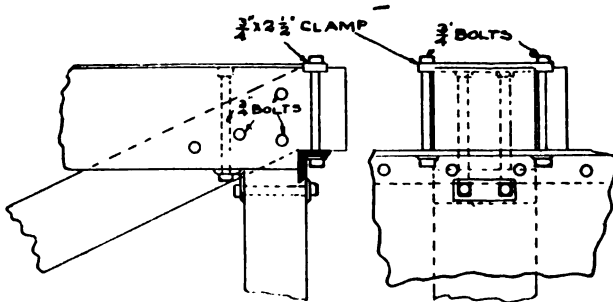


FIG. 45-B.

RULES 7 AND 92.



MANNER OF BLOCKING BEARING PIECE ON STEEL GONDOLA CARS



Figs. 45-A and 45-B show respectively the manner of blocking and bracing bearing-pieces on steel gondola cars with inside stake pockets and manner of blocking and bracing bearing-pieces on steel gondola cars without inside stake pockets.

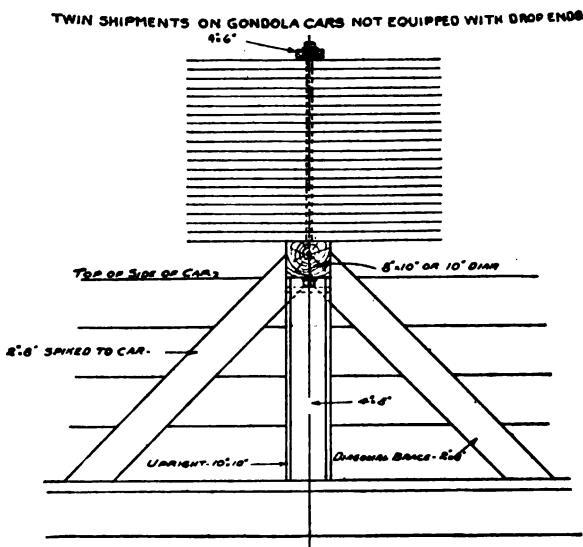
93. Long flexible material, like plates, etc., which can not be loaded as shown in Fig. 24, must be loaded on two bearing-pieces, and two or more sliding-pieces as in Figs. 41, 42, 43, 43-A and 43-B. The sliding-pieces must be four (4) inches lower than the bearing-pieces and must have flat iron one-fourth ( $\frac{1}{4}$ ) inch by six (6) inches, secured to their upper sides either with spikes or lag screws at each end. These iron pieces, which are intended to facilitate curving, must extend at least twenty-two (22) inches beyond each side of the lading and must be coated with grease before the lading is placed upon them. The bearing-pieces must be secured

to the car and the material clamped together in the same manner as described in Rules 71 and 80 to prevent it from shifting.

94. The BEARING-PIECES at each end of the load are the only ones to be provided with vertical rods and clamping-pieces. When the bearing-pieces are located near the center of the cars, as is the case with the end

FIG. 45-C.

SEE RULE 92.



pieces in Fig. 42, and when the load so carried is equal to one-half ( $\frac{1}{2}$ ) the capacity or over, the clamping-pieces must be secured with lateral bracing-pieces, as shown in Fig. 46, to prevent the breaking down of the sides when going around curves.

95. When material is loaded on two bearing-pieces and two sliding-pieces on gondola cars with drop ends, the same clearance must be provided between the lading and the car sides, as specified in Rule No. 91, Figs. 12 and 12-A.

96. If the lading requires two bearing-pieces and three or more sliding-pieces per car, the bearing-pieces must be provided with vertical rods and clamping-pieces as described in Rule No. 72 and shown in Fig. 43, and the sliding-pieces must be provided with flat iron, secured to the upper sides to allow for curving. For loads of this kind, overhang is measured from the bearing-pieces, to which the lading is clamped, to the end of the material.

97. If, in order to make up the allowable carrying capacity of the cars, SHORT MATERIAL IS LOADED ON THE FLOOR, with loads as per Figs. 40,

42 and 43, such material must be loaded in equal amounts on both sides of the car, so as to be properly balanced and not interfere with the curving of the trucks.

## RULES GOVERNING THE LOADING OF ROLLED MATERIAL OF SMALL SECTIONAL AREA.

### SINGLE LOADS.

98. Rails, bar-iron, channels, angles, etc., should, whenever possible, be loaded on SINGLE GONDOLA CARS INSIDE OF END GATES, which must, in all cases, be raised and securely fastened. Rolling freight must be loaded longitudinally with car and must be chocked to prevent end and side motion.

### RULE 98-A.

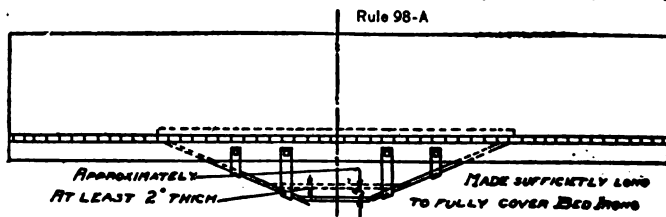
Pig iron, short billets, small castings, and material of similar character, should, as far as practicable, be loaded in flat floor gondola cars, and the door openings need not be boarded over. The lading, however, must be loaded over the bolsters. But should a few pieces not exceeding one layer in depth shift over doors in transit, be the doors either flush with top of floor or bottom of sills, the shipment will be considered acceptable, provided the doors and door mechanism are in good condition. Drop-end gondola cars must have the end gates raised and secured.

When flat cars are selected the lading must have end and side protection, consisting of plank of sufficient height and at least 2 inches in thickness placed against stakes spaced not more than 6 feet apart, and of the required dimensions as per Rule 12.

When hoppers or self-cleaning hoppers are selected the doors must be securely boarded over as per Fig. 45-D.

FIG. 45-D.

DIAGRAM OF HOPPER BOTTOM CAR, SHOWING THE APPLICATION OF PALKE BOTTOM FOR THE LOADING OF PIG IRON BILLETS, SMALL CASTINGS ETC.



99. Single flat cars, when used for loading material referred to in Rule 98, the ends of the car must be provided with hardwood end blocking not less than three (3) inches thick, securely braced to prevent shifting lengthwise, and at least four (4) stakes four (4) inches by five (5) inches in section must be placed on each side of car, or the lading may be securely clamped to the floor of car whenever possible, in accordance with Fig. 21.

## TWIN OR TRIPLE LOADS.

100. Material of this description, when loaded on two or more cars, should be secured as shown in Figs. 46, 47, 48 and 49.

101. Omitted, 1913. See Rule 93 for sliding-pieces and sliding-irons.

102. When loaded on two or more cars, the material must be fastened at the center by means of two vertical pieces of timber not less than four (4) inches by five (5) inches in section, held together by means of two 1-inch rods, as shown in Figs. 47 and 49.

FIG. 46.

STRUCTURAL MATERIAL LOADED ON FLAT CARS OR ON TOPS OF SIDES OF GONDOLA CARS

RULES 72-78 AND 94 AND 100.

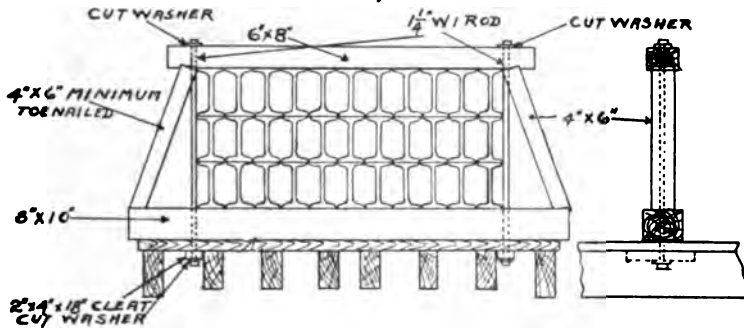
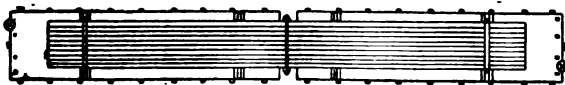


FIG. 47.

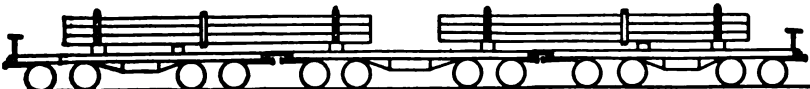


FIG. 48.



PLAN VIEW OF FIG. 47.

FIG. 49.

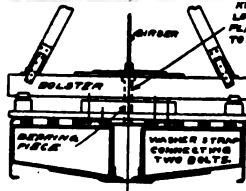
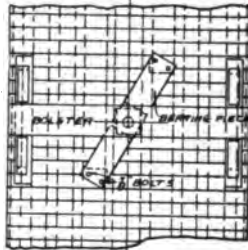


1012

FIG. 52.

SEE RULES 88, 99, 103, 104, 106 AND 111.

VERTICAL LADING OF LANE BIRDBERS.  
LOCATION OF BEARING PIECE FOR BOLSTERS  
FOR TWIN LOADS.  
CARS EQUIPPED WITH STEEL UNDER FRAMING.

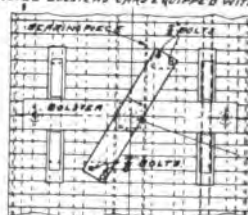


RING PIN SHOULD BE SUFFICIENTLY LONG TO REST ON CENTER SILL COVER PLATE WHICH SHOULD BE CUT TO ALLOW RING PIN TO PASS THROUGH.

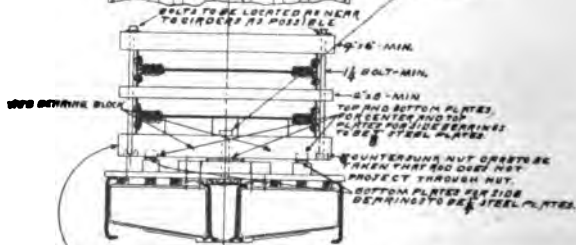
FIG. 53.

SEE RULES 98 AND 106.

HORIZONTAL LADING OF LANE BIRDBERS ON  
PIVOTED BOLSTERS CARS EQUIPPED WITH STEEL UNDER FRAMING.



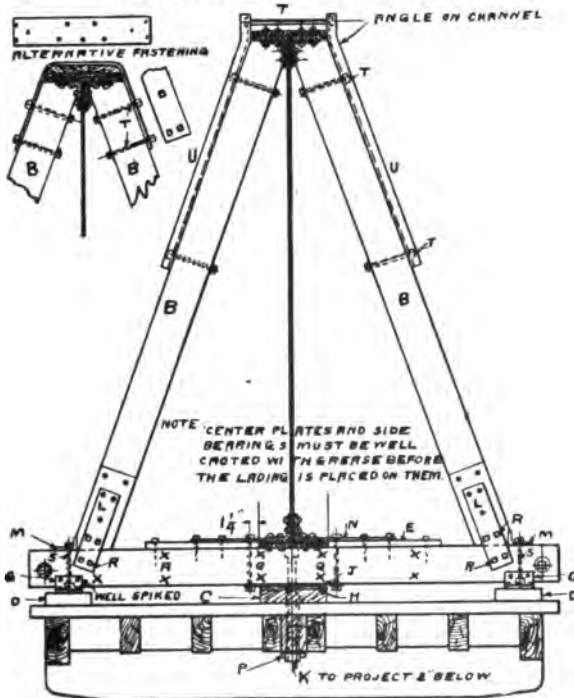
RINGPIN SHOULD BE SUFFICIENTLY LONG TO REST ON CENTER SILL COVER PLATE WHICH SHOULD BE CUT TO ALLOW RING PIN TO PASS THROUGH.



BOLSTERS SHOULD IN NO CASE BE MORE THAN 8\"/>

FIG. 54.

SEE RULES 103 AND 104, AND FIGS. 55-55-A.



FOR DIMENSIONS SEE TABLE RULE 104.

FIG. 54-A.



SEE RULE 104-B, LETTER F, AND FIGS. 54, 55-55-A.

FIG. 55.

SEE RULES 103 AND 104.

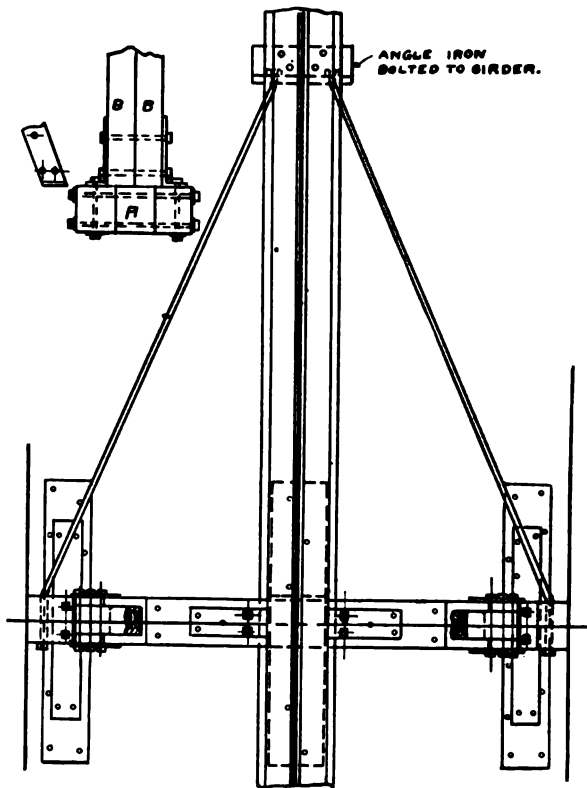
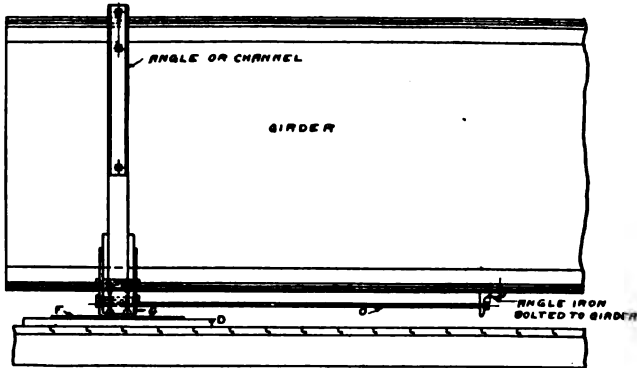


FIG. 55-A.

SEE RULES 103 AND 104 AND FIGS. 54-55.



SIDE VIEW OF FIG. 55.

103. Girders more than four (4) feet high, loaded on two or more cars in a vertical position, must be loaded on pivoted bolsters shown in Figs. 54 and 55. The bracing shown is for long girders. For other material the bracing must be equally strong.

Two or more girders may be loaded vertically, side by side, provided they are bolted together near pivoted bolsters, with proper spacing pieces between them in such a manner that they act as one girder.

104. THE MINIMUM DIMENSIONS of detail parts for different weights of lading are given in table on page 1016.

## LIST OF MATERIAL.

NAME.	Designation	No. Wanted.	For girders weighing not more than 30,000 lbs.	For girders weighing more than 30,000 lbs. and not exceeding 72,000 lbs.	For girders weighing more than 72,000 lbs. and not exceeding 116,000 lbs.
Bolster.....	A	1	8"x10" wide x9'6"	10"x14" wide x9'6"	12"x16" wide x9'6"
Struts.....	B	2	6"x8"	6"x10"	6"x12"
Center plate backing.....	C	1	3"x12"x5'	3"x12"x5'	3"x12"x5'
Side bearing backing.....	D	2	3"x10"x5'	3"x10"x5'	3"x10"x5'
Bolster side stops.....	E	2	1"x10"x2'	1"x10"x2'	1"x10"x2'
Side bearing plate, bottom.....	F	1	6"x4"x3'6"	6"x4"x3'6"	6"x4"x4'
Side bearing plate, top (bent).....	G	1	6"x4"x1'3"	6"x4"x1'7"	6"x4"x1'9"
Center plate, bottom.....	H	1	12"x4"x12"	12"x4"x12"	12"x4"x12"
Center plate, top.....	I	1	12"x4"x12"	12"x4"x12"	12"x4"x12"
Center pin.....	J	1	2 1/2" diam.	2 1/2" diam.	2 1/2" diam.
Strut Straps.....	K	1	5"x4"x1'6"	5"x4"x1'8"	5"x4"x1'6"
Strut angles.....	L	4	3 1/2"x5 1/2"x9 1/2" long	3 1/2"x5 1/2"x13 1/2" long	3 1/2"x5 1/2"x15' long
Flange clamps.....	M	2	6"x4 1/2"x1'4"	6"x4 1/2"x1'4"	6"x4 1/2"x1'4"
Brace rods.....	N	2	1" rod or 2 1/2"x1 1/2" flat	1 1/2" rod or 3"x1 1/2" flat	1 1/2" rod or 3"x1 1/2" flat
Bolts for center plate backing.....	O	6	1" diam.	1 1/2" diam.	1 1/2" diam.
Bolts for flange clamps.....	P	4	1 1/2" diam.	1 1/2" diam.	1 1/2" diam.
Bolts for strut straps.....	Q	4	1 1/2" diam.	1 1/2" diam.	1 1/2" diam.
Bolts for strut angles.....	R	8	1 1/2" diam.	1 1/2" diam.	1 1/2" diam.
Bolts for strut tops.....	S	4	1 1/2" diam.	1 1/2" diam.	1 1/2" diam.
Strut top irons.....	T	4	6" channels, or angle, 4'10" long	6" channels, or angle, 4'10" long	6" channels, or angle, 4'10" long
	U	2			

\*May be made of two pieces, securely bolted together.

†To be 1" less than flange of girder.

A. Struts must be neatly fitted and driven into place.

B. If the diagonal brace rods at one end are attached to girder between bolsters, those at the other end must likewise be attached to girder between bolsters, or brace rods at both ends may be attached to overhanging ends of the girders. See Figs. 54, 55 and 55-A.

C. Bolts through rivet holes in girder should be not more than one-sixteenth (1-16) inch less in diameter than the holes.

D. Bolsters, when made of one piece, should have transverse bolts not less than  $\frac{3}{4}$  inch in diameter, one to either side of the center pin, to avoid splitting the bolster. When made of two or three pieces, as per notes I and K, must be securely fastened together by means of bolts in location marked (X), Fig. 54.

E. Filling-pieces should be placed between stringers of the same length and directly underneath center plate backing. Six bolts should be used to tie the two pieces together.

F. For girders more than seventy (70) feet long, one center-pin hole should be made oblong, in car body, as shown in small diagram, permitting two (2) inches longitudinal motion.

G. Girders more than eight (8) feet deep, and weighing less than thirty thousand (30,000) pounds, should have bolster equipment specified for girders weighing more than thirty thousand (30,000) pounds and less than seventy-two thousand (72,000) pounds.

H. For girders more than fifty (50) feet long, if necessary to pass a curve of more than twenty (20) degrees curvature, nuts on one bolster should be loosened to allow girder to shift on bolster. After curve is passed the original firm condition must be restored.

I. The ten (10) by fourteen (14) inch bolster may be built up of two pieces ten (10) inches deep by seven (7) inches wide, or a bolster eight (8) inches deep and twenty (20) inches wide made of two pieces eight (8) by ten (10) inches may be substituted.

K. The twelve (12) by sixteen (16) inch bolster may be built up of two pieces twelve (12) inches deep and eight (8) inches wide. A bolster ten (10) inches deep by twenty-four (24) inches wide made of three pieces ten (10) by eight (8) inches, or a bolster eight (8) inches deep by thirty-six (36) inches wide made of three pieces eight (8) by twelve (12) inches, may be substituted.

## RULES GOVERNING THE LOADING OF TURNTABLES.

105. Turntables may be loaded either RIGHT SIDE UP, as shown in Fig. 50, or UPSIDE DOWN, as shown in Fig. 51.

106. Each turntable, when loaded right side up, must rest on two cribbings made of timber not less than ten (10) inches square, notched and securely bolted with seven-eighths ( $\frac{7}{8}$ ) inch bolts.

107. The LOWER TRANSVERSE TIMBERS of the cribbing must extend the full width of the car, and must be bolted to the car floor, between the stringers, with one seven-eighths ( $\frac{7}{8}$ ) inch bolt at each end of each timber. Underneath the floor must be placed boards two (2) by six (6) inches in section, and of sufficient length to allow all the bolts on a side to pass through a board.

108. When the height of the cribbing will be sufficient by the use of one transverse and one longitudinal course of timbers besides the bolster which is secured to the table, the TRANSVERSE TIMBERS on the floor, of which there should not be less than two, should be placed not less than eighteen (18) inches apart, and the three top timbers must be notched in between the floor timbers, as shown in Fig. 50.

When the required height of the cribbing makes it necessary to use three or more courses of timber, the distance between the floor timbers must be correspondingly increased.

109. Turntables loaded on two or more cars forming TWIN LOADS must rest on pivoted bolsters, which must be firmly fastened to the turntable. The bolsters, center plates, center pins and side bearings must conform to dimensions given in table of paragraph 104.

110. The BOLSTERS may be held to the TURNTABLE either in the manner shown in figure, or if rivet holes are available in the lower flanges, it may be held with four three-fourths ( $\frac{3}{4}$ ) inch bolts at each end. They must also be secured to the cribbing by a center pin two and one-half ( $2\frac{1}{2}$ ) inches in diameter, passing through bolster, center plates and top timbers of cribbing.

111. The BOLSTER SUPPORT on car must not be less than six (6) inches deep by eighteen (18) inches wide and must be securely fastened to car floor with two seven-eighths ( $\frac{7}{8}$ ) inch bolts at each end, or the support may be made as shown for long girders.

FIG. 50.

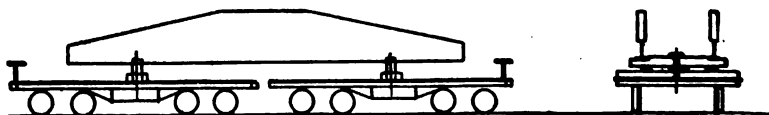
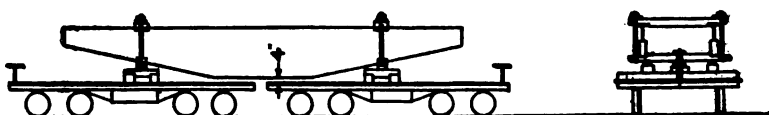


FIG. 51.



# RULES GOVERNING THE LOADING OF PIPE ON OPEN CARS.

(For size of stakes, see Rules 12 and 13.)

112. GENERAL INSTRUCTIONS WITH RESPECT TO WIRING AND STAKING.—There should be not less than three pairs of stakes to each pile when the material is twenty-three feet or less in length. The top of each pair of stakes to be held together by means of six strands equal to three wrappings of good  $\frac{1}{8}$ -inch diameter wire resting on the pipe, in addition to any intermediate wiring or dunnage strips for character of shipments, as provided for in succeeding paragraphs. Intermediate wiring need not be used when load is less than three feet above car sides. If pipe is more than twenty-three feet long, there must be at least four pairs of stakes, but where dunnage strips are used between consecutive layers of pipe three pairs of stakes should be sufficient.

If pipe eight (8) feet or less in length is loaded above the end or end gates of car, side and end protection must be provided.

112-A. GONDOLA CARS.—Wrought-iron pipe 12 inches or less in diameter should be loaded in gondola cars. Gondola cars loaded higher than 3 feet above top of sides with wrought-iron pipe 12 inches or less in diameter should have the stakes pulled together after pipe has been loaded to top of sides, by means of a rod with turnbuckles or any other suitable means, until the side stakes are slightly inclined toward center of car. Opposite stakes should then be secured by wire at height of car sides, and further loading of pipe should be placed on this wire. Top of stakes should again be secured by wire, as provided for in General Rule No. 112. Where facilities do not make it possible to properly apply the intermediate wiring, bearing-pieces not less than 4 inches wide and 1 inch thick, spaced not more than 6 feet apart, may be placed between consecutive courses of

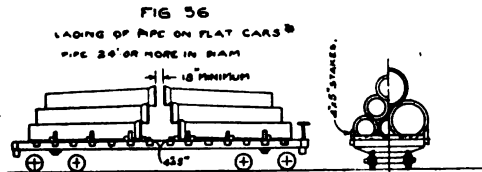


FIG. 57.

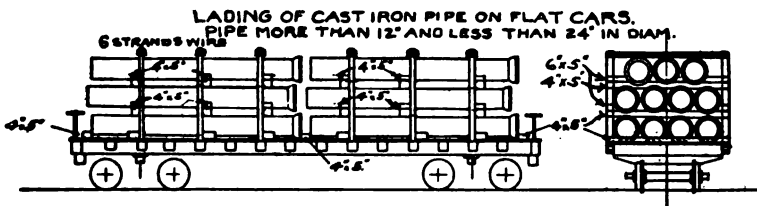


FIG. 58.

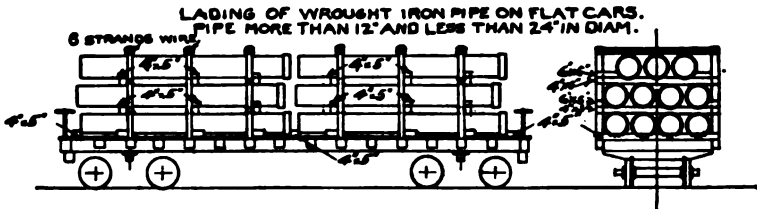
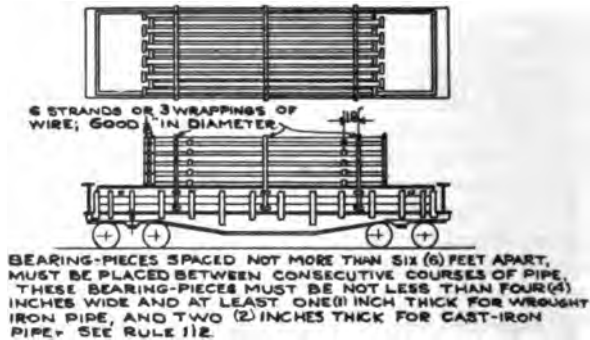


FIG. 59.

**LOADING ONE LENGTH OF ALL PIPE OR TUBING  
12" OR LESS IN DIAMETER IN GONDOLA CARS.  
RULE 112 SHOWS WHETHER 3 OR 4 PAIRS  
OF STAKES SHOULD BE USED.**



pipe. Each course of pipe should be securely blocked on both sides to prevent rolling.

Wrought-iron pipe of the smaller sizes, approximately  $1\frac{1}{2}$  inches in diameter and less, should not be loaded inside of larger sizes of pipe, unless below the ends or end gates of cars.

Wrought-iron pipe of the smaller sizes, approximately  $1\frac{1}{2}$  inches in diameter and less, should not be loaded on top of the larger sizes of pipe, unless the load is below the end or end gates of cars, except where the smaller pipe is securely tied in bundles.

**112-B. GONDOLA CARS.**—Cast-iron pipe 12 inches or less in diameter should be loaded in gondola cars. Cars with 30-inch sides or over may have pipe 10 inches or 12 inches in diameter piled two courses above the sides of cars, but these two courses must be piled in pyramidal form, with the bell ends of each succeeding course overlapping each other. The pipe next to the car sides must extend at least one-half the diameter at bell end below the car sides. When cars are loaded in this manner the pipe must be so loaded in the car that there will not be more than 24 inches between the ends of the two top courses in the center.

113. **FLAT CARS.**—When cast-iron pipe more than 12 inches and less than 24 inches in diameter is loaded on flat cars, it must be loaded so that ends of pipe are not less than 18 inches from end of car. Each course must be separated from the other immediately below by a bearing-piece of timber not less than 2 inches thick by 4 inches wide, extending the full width of lading. The bearing-piece at bell end of pipe to be placed as near the bell end of pipe as location of stake pockets will permit. The distance must not be more than 24 inches between the ends of the two top courses in the center. (See Rule 112 for wiring and staking.)

114. **FLAT CARS.**—All wrought-iron pipe more than 12 inches and less than 24 inches in diameter, loaded on flat cars, must be loaded so

FIG. 60.

LOADING TWO LENGTHS OF ALL PIPE OR TUBING 12" OR LESS IN DIAMETER IN GONDOLA CARS.

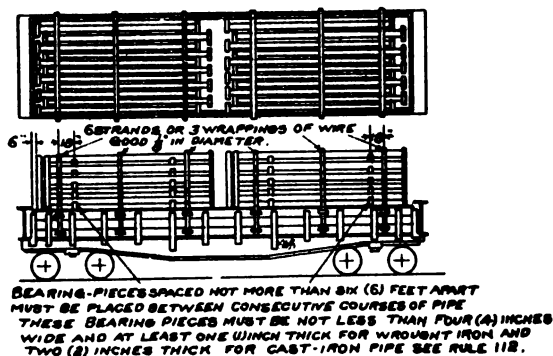
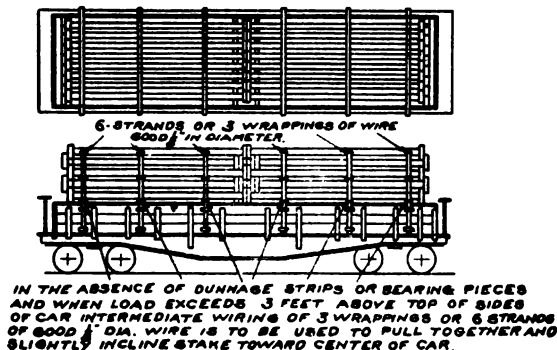


FIG. 60-A.

LOADING TWO LENGTHS OF ALL PIPE OR TUBING 20" OR LESS IN DIAMETER AND 23'0" OR LESS IN LENGTH IN GONDOLA CARS.



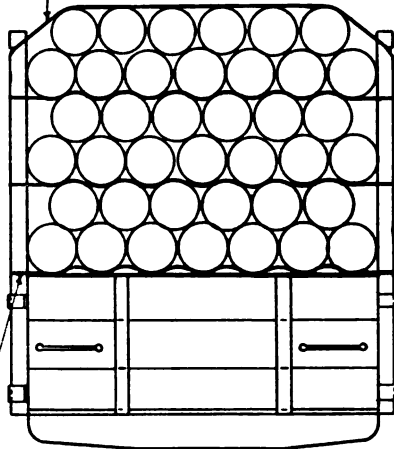
that the ends of pipe will not be less than 18 inches from end of car. Each course must be separated from the other immediately below by a bearing-piece of timber not less than 2 inches by 4 inches, extending the full width of lading. The bearing-piece at sleeve end of pipe to be placed as near the sleeve end of pipe as location of stake pockets on the car will permit. (See Rule 112 for wiring and staking.)

115. GONDOLA CARS.— All cast-iron pipe 12 inches and including 24 inches in diameter, when loaded in gondola cars, must have the bell ends overlapping each other. The bell ends of the pipe next to the car sides

FIG 61.

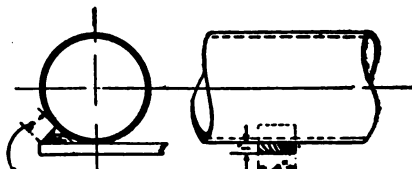
LOADING OF ALL PIPE OR TUBING 20" OR LESS IN DIAMETER  
AND 23'-0" OR LESS IN LENGTH IN GONDOLA CARS  
END VIEW OF FIG. 60-A.

6 STRANDS OR 3 WRAPPINGS OF  
WIRE 6000  $\frac{1}{8}$ " IN DIAMETER



IN THE ABSENCE OF DUNNAGE STRIPS OR BEARING PIECES  
AND WHEN LOAD EXCEEDS 3 FEET ABOVE TOP OF SIDES  
OF CAR INTERMEDIATE WIRING OF 3 WRAPPINGS OR 6 STRANDS  
OF 6000  $\frac{1}{8}$ " DIA. WIRE IS TO BE USED TO PULL TOGETHER  
AND SLIGHTLY INCLINE STAKE TOWARD CENTER OF CAR.

ENLARGED VIEW SHOWING CHECK AT  
EACH SIDE OF PIPE ON EACH BEARING PIECE



5" CHECK FOR 12" PIPE SECURED WITH FOUR 60 NAIL  
3" " " LESS THAN 12" PIPE SECURED WITH FOUR 4" NAIL

must extend at least 5 inches below the side of car. Additional courses may be loaded on the car in pyramidal form. The top courses of pipe on the two piles must not be more than 24 inches apart in the center.

115-A. GONDOLA AND FLAT CARS.—All wrought or cast iron pipe 24 inches or more in diameter must be loaded in pyramidal form, with the bell ends interlocking each other. The ends of bottom pipe must not be less than 18 inches from end of car on flat cars, and 6 inches from the end plank on gondola cars. The bell or sleeve ends of the top courses must overlap those of the courses immediately below and the top courses must not be more than 24 inches apart in the center. The bottom course must be securely blocked on each side of each pile with not less than three blocks, 8 inches long and of a height equal to one-quarter the diameter of the pipe, provided that blocking more than ten (10) inches in height will not be required. The blocks must be neatly fitted to the pipe, shouldered and beveled on the outside and secured against displacement. Each end of bottom course must be provided with end blocking not less than 4 inches by 5 inches in section, securely fastened to the floor of car when pipe is loaded on flat cars. (See Rule 112 for wiring and staking.)

116. BLOCKING of more than ten (10) inches in height will not be required, but on loads of pipe three (3) feet or over in diameter the blocking must be stayed by suitable chocking.

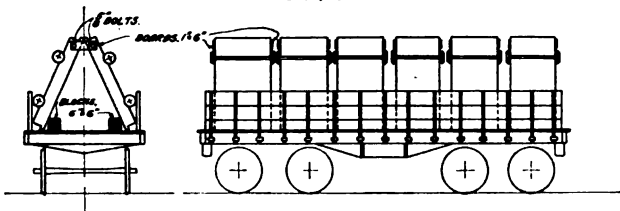
117. There must be three STAKES not less than fifteen (15) inches high above the floor of the car on each side of each pile, where pipe is loaded in pyramidal form.

117-A. GONDOLA CARS.—Galvanized corrugated sheet-iron culvert pipe of all sizes, for size and number of stakes to be used, see Rules 12 and 112. When mixed sizes are loaded on the same car, the small pipe, when possible, should be placed inside the larger size. In loading galvanized corrugated sheet-iron pipe Rule 9 must be complied with.

117-C. MINING CARS AND SIMILAR VEHICLES.—The length of cars being equal to or greater than twice the height of car side, if loaded in gondola cars on ends, the broad side or bottom must be loaded parallel with car side and securely blocked against side of car, the other ends brought together in a cone shape. Each pair of cars or vehicles must be

FIG. 61-A  
METHOD OF LOADING MINING CARS AND  
SIMILAR VEHICLES IN GONDOLA CARS.

RULE 117-C



securely fastened together on each side with a board not less than 1 by 6 inches, bolted to each car or vehicle with one  $\frac{5}{8}$ -inch bolt, the entire load to be tied together with four (4) strands, two wrappings of good  $\frac{1}{4}$ -inch diameter wire. The blocking must be of sound timber not less than 6 by 6 inches square. Fig. 61-A shows substantially how the load is to be secured.

## **RULES GOVERNING LOADING OF STONE AND BRICK ON OPEN CARS.**

### **GENERAL.**

118. All stone not provided for should be secured by the necessary end and side protection, or both. In all cases when the floor of the car is in such condition that stone not loaded on strips, brush or straw is liable to rock or shift on account of the condition of the car floor, the stone must be securely wedged and cleated.

Where strips for separating stone to keep lading clear of the car floor are referred to in this rule, they should be soft wood not less than  $1\frac{1}{2}$  inches wide by  $\frac{3}{4}$  inch in thickness.

Standard boards should consist of sound, hardwood lumber at least 1 inch in thickness and not less than 6 inches in width. In all cases where required, boards must be nailed to the inside of the stakes or braces with at least three ten-penny nails at each end of board.

All stakes, wedges and braces must be of sound, hardwood lumber, free from knots that will materially impair their strength. Stakes must be of sufficient size to substantially fill the stake pockets, and may be sawed, split or round. Stakes must be at least 3 inches wide (parallel with the side of car) by 4 inches thick (at right angles to car), or saplings at least 4 inches in diameter.

Unless special arrangements have been made, no stone must extend beyond the outside edge of car floor.

### **END PROTECTION.**

Cars not provided with end stake pockets; the necessary end protection must be secured by toe-nailing stakes against the inside edge of a hardwood strip not less than 4 by 4 inches in section (or 2 by 4 inches in section, securely nailed to the floor of the car, one on top of the other), placed crosswise of the car and inside of the end sills. The stakes should extend at least 4 inches above the load and must be wired back to the side stakes in the first or second pocket.

118-A. Small stone, small rip-rap, spalls, rubble, one-man stone, paving blocks, brick, tiling, fireproofing, mill cinder or slag made in cakes, and similar material that can be handled by one or two men, should be loaded in gondola cars. The stone may be loaded over drop doors, not boarded over, provided the doors and door mechanism are in good condition.

When the lading consists of small stone, each of which weighs 100 pounds or over, it may be loaded in low-side gondolas or flat cars. When loaded in low-side gondolas, standard stakes and boards must be applied opposite any pieces in the two outside layers that extend above the car sides more than one-half the height of the stone. The end of the side boards must extend at least 12 inches beyond the end of the stone. The stone inside of the two outside pieces may, provided they rest on the car floor, extend above the top of the outside stone a distance not exceeding the height of the outside stone. When loaded on flat cars, standard end staking and boarding should be applied, and the sides should be protected by standard stakes and boards opposite the stone. End and side protection should be applied as specified in Rule 119-A.

119. Flagging, slabs and stone sawed on two sides should be loaded on either gondola or flat cars. The first layer of stone resting on the car floor should be placed on straw, brush or strips of wood of sufficient thickness to insure lading being kept clear of the car floor. Strips when used should be placed crosswise or lengthwise on the car floor, depending upon the class and dimensions of stone, but in no case is it good practice to use more than two bearing strips per length of stone.

Flagging and stone sawed on two sides should, according to the best practice, be loaded flatwise on each other without the use of any parting material.

No stone should be loaded on top of a single stone or tier of stone where the bearing surface of the top stone is more than one-half greater than the stone underneath. The top stone should be centered on the stone or tier upon which it is carried.

Stone sawed on two sides, slabs and flagging, loaded in tiers each of which contains at least 20 square feet of bearing surface resting on car floor, should be protected at the ends by two standard end stakes extending to the height of stone. A standard board should also be securely nailed to the inside of the end stakes and extend full width of the stone. When tiers are made up of stone, each of which contains 20 square feet or more bearing surface resting on car floor, having dimensions of the bearing surface on the car floor less than 2 feet, such stone should have standard side protection as specified in Rule 119-A unless such stone is loaded crosswise the car.

119-A. When flagging and stone sawed on two sides, loaded in tiers 32 inches or more in height or made up of stone containing less than 20 square feet each, of surface bearing resting on the car floor, two standard stakes should be placed opposite each tier of stone, in addition to the end protection specified in Rule 119. The distance from the end of stone to the inside of stake should not be less than 12 inches, measuring lengthwise of car.

If on account of the location of the stake pockets or for any other reason this distance can not be obtained, the standard boards should be pro-

vided opposite the tier of stone to prevent any possibility of the stone becoming insecure. The boards should be securely nailed to the inside of the stakes.

For any tier built up of stone sawed on two sides or flagging 32 inches or more in height, the side stakes opposite such tier should be securely wired together with two wrappings equal to four strands of good  $\frac{1}{8}$ -inch diameter wire or two 1 by 4 inch boards (one on either side of stake) fastened with at least three ten-penny nails, and the stakes must extend at least 4 inches above the top of stone.

119-B. Small resawed and small planed stone should always be loaded lengthwise of car when practicable and it should have at least two standard stakes opposite each tier. The distance from the end of the stone to the inside of the stake should be not less than 12 inches measured lengthwise of car. If on account of the location of the stake pockets or for any other reason this distance can not be obtained, standard boards should be provided opposite the tier of stone to prevent any possibility of the stone becoming insecure. Outside tiers of small resawed stone should be placed within at least 3 inches of the side protection, preferably closer.

Large resawed and large planed stone (each of which contains 20 square feet of bearing surface or more resting on the car floor), piled in tiers, should be loaded the same as stone sawed on two sides.

For all resawed and planed stone, both large and small, end protection should be provided as specified in Rule 119 governing the loading of flagging and stone sawed on two sides. In addition, care should be used to see that boards are placed and spaced to prevent the end pieces of stone against shifting.

All planed building stone should, in addition to the end and side protection, be securely wedged, cleated or braced to prevent the stone from shifting.

119-C (CURBING). Curbing loaded lengthwise on flat cars should have two standard stakes opposite each outside piece. The distance from the end of the stone to the inside of stakes should be not less than 12 inches measured lengthwise of car. Otherwise the standard board must be securely nailed to the inside of the stake. Stakes should extend at least two-thirds of the height of the outside stone.

Standard end protection as specified in Rule 119 should be provided, or the stone may be protected by strips approximately 4 by 4 inches (or

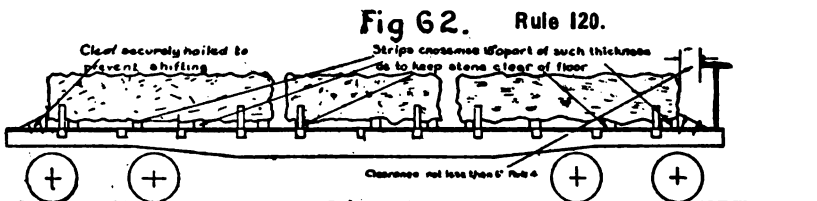
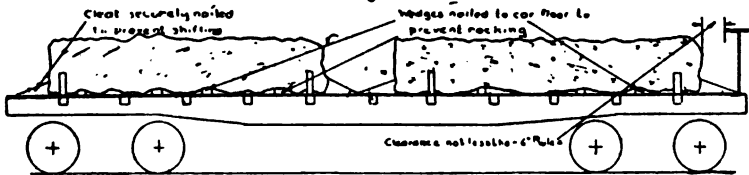


Fig 63. Rule 120.



two strips 2 by 4 inches securely nailed to the floor of the car, one on top of the other), inside the end sill.

When split or sawed curbing is loaded crosswise of car (split curbing being placed on edge and sawed curbing laid flat in tiers), the end protection as specified in Rule 119 should be provided. When rough-quarried curbing is loaded on edge crosswise of car, in addition to the end protection referred to in Rule 119, strips at least 2 by 2 inches (or two strips 1 by 2 inches securely nailed to the car floor, one on top of the other) should be nailed lengthwise of the car and close to the end of the stone.

If rough-quarry curbing is loaded flatwise in tiers it should be protected at the sides as specified in Rule 119-A.

**119-D (DRESSED STONE).** On account of the various sizes and shapes of dressed stone, no specific rules can be made governing their loading. Such stone, however, may be loaded on flat, low or high side gondolas or box cars, depending upon the size of the stones and facilities for unloading at destination. When loaded on flat cars, standard end and side protection must be applied as specified in Rule 119-A.

When practicable, dressed stone should be separated by strips of soft wood or packed in excelsior, stone dust or other suitable material. It should always be securely cleated or blocked to prevent shifting. In all cases dressed stone should be kept clear of the car floor, being loaded on suitable strips, straw or brush.

**120.** Large block stone, bridge stone, shoddy, breakwater or other large stone containing as much as 30 cubic feet and having a regular surface of at least 8 square feet to rest on car floor, but no dimension of such bearing surface being less than 1 foot 6 inches, should be protected at the ends with standard end stakes extending at least one-half the height of the stone. In no case must the height of the stone be more than one and one-half times the smallest dimension resting on the car floor. The distance from the end of the stone to the inside edge of the stake must be not less than 6 inches measured across the car; otherwise standard board should be securely nailed to the inside of the stakes. When single large blocks as much as 6 feet in length are loaded crosswise of the car, the end protection should be two standard stakes extending at least one-half the height of the stone.

Any large block, bridge, shoddy or other large stone having regular surfaces not covered by the preceding paragraph must, in addition to the

specified end protection, be secured at the sides by the standard stakes opposite the stone. The distance from the end of stone to the inside of the stakes must be not less than 12 inches measured lengthwise of car. If on account of the location of the stake pockets or for any other reason this distance can not be obtained, standard boards should be provided opposite the tier of stone to prevent any possibility of the stone becoming insecure. Boards should be securely nailed to the inside of the stakes.

Large block, bridge, shoddy or other large stone with irregular surfaces, loaded on flat cars, must be securely wedged, stripped or blocked to prevent the stone from rocking. Standard end protection must be provided as specified in the first paragraph of this rule and two stakes must be placed opposite each outside piece of stone. The end of the stone must not be less than 12 inches from the inside edge of the stakes measured lengthwise of car. If on account of the location of stake pockets or for any other reason this distance can not be obtained, standard boards should be provided opposite the blocks of stone to prevent any possibility of the stone becoming insecure. When such stone is loaded in gondola cars it should be securely wedged, stripped or blocked if there is any possibility of the stone rocking. Large block, bridge, shoddy, breakwater or other large stone should not be loaded in gondola cars unless there are derrick facilities for unloading.

120-A. Gondolas with drop or hopper doors not boarded over should have lading cleated and chocked so as to prevent shifting over doors.

120-B. GRINDSTONES.—GONDOLA CARS: Grindstones 4 feet and over in diameter should be loaded as per Fig. 65. The bottom stone of each tier should rest evenly on four heaps of stone turnings or grindings placed upon the floor of the car, keeping the lading at least 2 inches clear of floor. The successive layers of stones must be separated by two 1 by 2 inch softwood strips placed flat and crosswise of car. *Hardwood stakes to fill the holes* in the grindstones must be placed through each tier extending from floor of car to 6 inches above top of tier, and all the stakes must be tied together at the top by 1 inch by 4 inch boards, fastened with four ten-penny nails to the side of each stake. When the lading consists of single grindstones, placed on the floor of all-steel gondola cars, each stone must rest upon the stone grindings as provided for above and the stones separated by brush placed between them; when placed on cars with wood floors each stone must be chocked as shown for flat cars, Fig. 66.

FLAT CARS: Grindstones 4 feet and over in diameter should be loaded as per Fig. 66. The bottom stone of each tier should rest on two 1 by 2 inch softwood strips nailed flat and crosswise to floor of car, and be held in place by four hardwood chocks at least 12 inches long and not less than 4 inches high, securely spiked to floor of car. The successive stones of each tier must rest on similar softwood strips. *Hardwood stakes to fill the holes* in the grindstones must be placed through each tier, extending from floor of car to 6 inches above top of tier, and all the stakes must be tied together at the top by 1 by 4 inch boards, fastened with four ten-penny

nails to the side of each stake. Lading consisting of single stones must rest on softwood strips and each stone chocked as above described.

If all-steel cars are used, the material should be securely chocked and wedged between stakes.

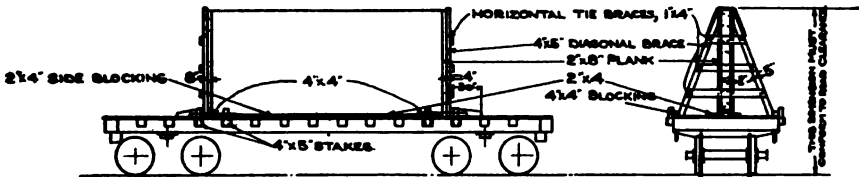
## RULES GOVERNING THE LOADING OF CYLINDRICAL BOILER SHELLS AND TANKS.

121. Lading of this description eight (8) feet or less in diameter, when loaded on single flat or gondola cars, should be substantially chocked with side blocking in height equal to one-seventh the diameter of the shell, providing that blocking of more than ten (10) inches in height will not be required. End blocking to be not less than four (4) inches in height. See Fig. 64-A.

Lading over eight (8) feet in diameter, when loaded on single flat or gondola cars with sides less than 30 inches in height, must be substantially chocked with side blocking not less than ten (10) inches in height and backed up by the use of stakes in the stake pockets, and in addition to this must be secured with two (2) bands of not less than three-quarter

**FIG. 64**  
RULE 122

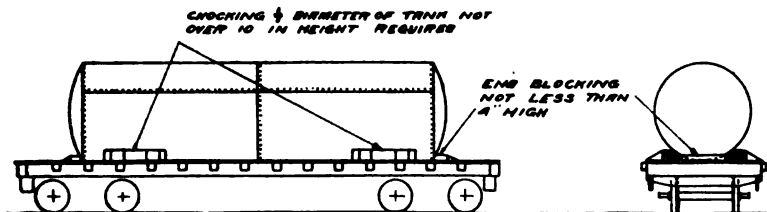
### LADING OF PLATE GLASS ON FLAT CARS.



**FIG 64 A**

RULE 121

### BOILER SHELLS & TANKS 8 FT OR LESS IN DIAMETER

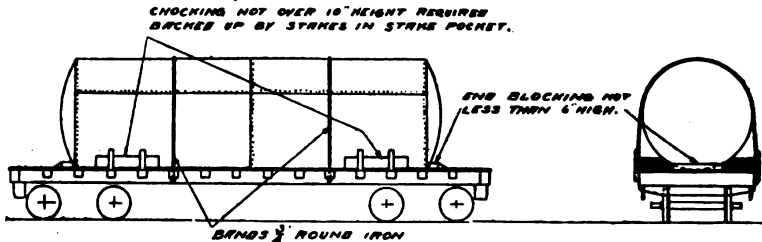


( $\frac{3}{4}$ ) inch round iron or flat bands of equal section. End blocking to be not less than six (6) inches in height, bolted to car floor and securely cleated. See Fig. 64-B.

**FIG 64-B**

RULE 121.

**BOILER SHELLS & TANKS OVER 8 FT. IN DIAMETER.**



When loaded in gondola cars with sides thirty (30) inches or over in height the bands will be unnecessary, but precaution in regard to blocking must be taken as specified for lading eight (8) feet in diameter.

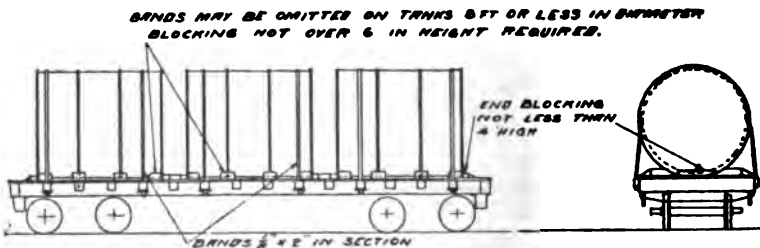
When such lading is placed upon two (2) or more cars as a tandem shipment it should be secured with two (2) bands of not less than seven-eighths ( $\frac{7}{8}$ ) inch round iron or flat bands of equal section, in addition to the prescribed blocking.

Steel tanks, lined or unlined, in sections weighing not over 2,500 pounds per section, eight (8) feet or less in diameter, when loaded on single flat or gondola cars, must be substantially chocked on each side with blocks not less than six (6) inches in height and of sufficient length and

**FIG 64-C**

RULE 121.

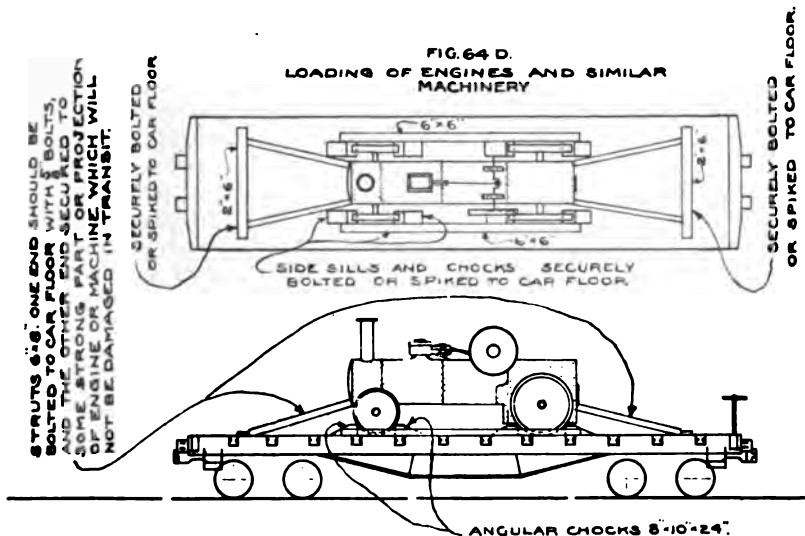
**SECTIONS OF BOILERS, TANKS OR SHELLS OVER 8 FEET IN DIAMETER WEIGHING LESS THAN 2500 LBS. PER SECTION.**



width so that they may be securely spiked to the floor of the car. End blocking to be not less than four (4) inches in height and of sufficient length to provide for proper bearing area against head of tank or shell and to be securely spiked to the floor of the car. If more than eight (8) feet in diameter, the same side and end chocking is to be used, and in addition each tank or part of tank must be secured with two (2) bands not less than  $\frac{1}{4}$  by 2 inches in section passing over the top and properly secured to the floor or stake pockets of the car. In lieu of the bands over the top of the shell, the same may be secured to the floor of the car or stake pockets by straps of three-quarter ( $\frac{3}{4}$ ) inch round iron or equal section bolted to the flange of the tank or shell with not less than two (2) bolts, the lower end of the strap passing through the floor or stake pocket. See Fig. 64-C.

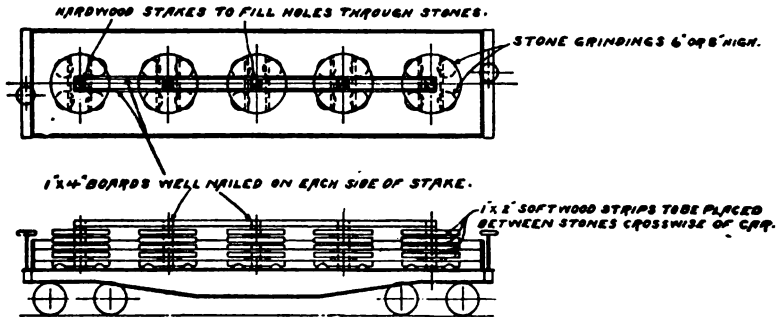
121-A. When smoke stacks are shipped on same car with boiler, not less than four (4) 4 by 4 inch stakes should be applied to each side of car, and each pair of stakes tied together with 1 by 5 inch cross braces, nailed to each side of stakes with three (3) ten-penny nails. The smoke stacks should be loaded on top of cross braces and securely wired to them with  $\frac{1}{8}$ -inch diameter wire. The projection of stakes above cross brace should not be less than one-half the diameter of smoke stack.

121-B. Shipment of engines and similar machinery loaded on their own wheels should have wheels securely chocked fore and aft and longitudinal sills placed on the outside of wheels and securely fastened to floor of car. Struts should be used to prevent the heavy parts of the engine and similar machinery shifting endwise. One end of the strut should be placed against some strong protection on engine or machinery — the other end being securely fastened to floor of car. See General Fig. 64-D.



**FIG. 65.**  
**RULE 120-B**

**MANNER OF LOADING GRINDSTONES IN GONDOLA CARS.**



### **RULES GOVERNING LOADING OF PLATE GLASS ON FLAT CARS.**

122. Large pieces of plate glass carried on flat cars and gondola cars should be loaded vertically and substantially secured by cleats on the floor. Side brace at ends must be provided as shown in Fig. 64.

### **RULES GOVERNING THE LOADING OF MOUNTED WHEELS ON OPEN CARS.**

122-A. Mounted wheels may be loaded on flat cars, as shown by Figs. 66-B and 66-C. If Fig. 66-B is followed the end blocking must be not less than 8 by 8 inches in section in one piece, or made up of two pieces of hardwood of equivalent section and secured by end stakes in addition to bolts through floor, or by separate blocking pieces secured to floor and end sill with three-quarter ( $\frac{3}{4}$ ) inch bolts. In addition to this, for a full load, five pair of wheels must be secured by two (2) inch by four (4) inch hardwood braces as shown, spiked to floor of car.

If Fig. 66-C is followed, three pairs of wheels at either end of load are to be tied together, using three-quarter ( $\frac{3}{4}$ ) inch rods with clamp plates or three-quarter ( $\frac{3}{4}$ ) inch U rod and plate as shown, and blocking at ends and along sides of hardwood not less than 4 by 8 inches, joined and bolted to car floor by either of the methods shown in Fig. 66-C.

### **RULES GOVERNING LOADING OF SCRAP JUNK AND SIMILAR MATERIALS ON OPEN CARS WITH OR WITHOUT RACKS.**

123. When open cars are loaded with material such as scrap, junk, etc., the load must not extend above the sides or racks, if the latter are provided, unless top of load is securely tied down with sufficient num-

ber of strands of good  $\frac{1}{8}$ -inch diameter wire, to prevent lading from rolling off. If racks are used, the spaces between the slats should be sufficiently sealed, to prevent loss of material or ends of pieces working through. See Fig. 66-A.

123-A. Iron ore and similar material, transported in open cars, should be loaded as shown in Fig. 66-D.

FIG. 66.

RULE 120-B

MANNER OF LOADING GRINDSTONES  
ON FLAT CARS.

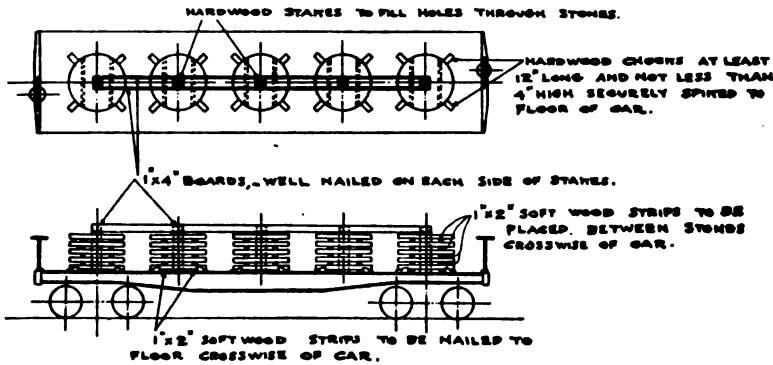


FIG. 66-A.

RULE 123

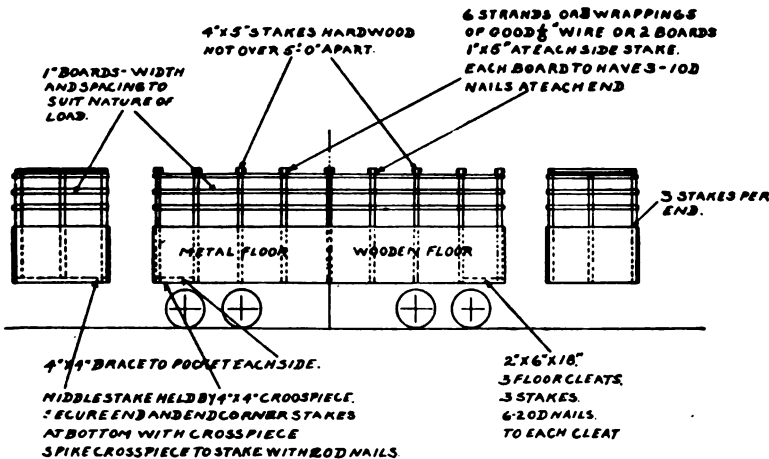


FIG. 66-B.

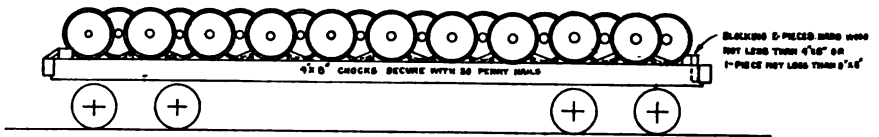
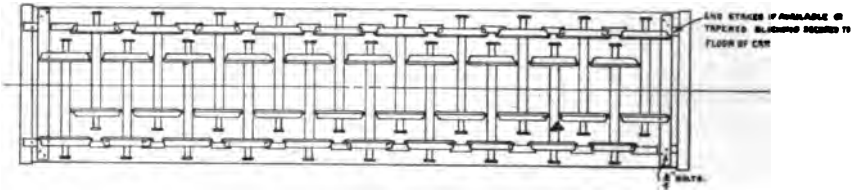
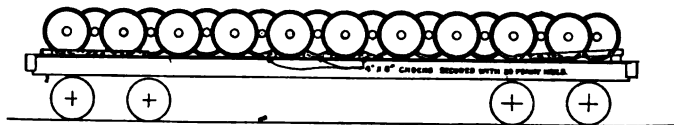
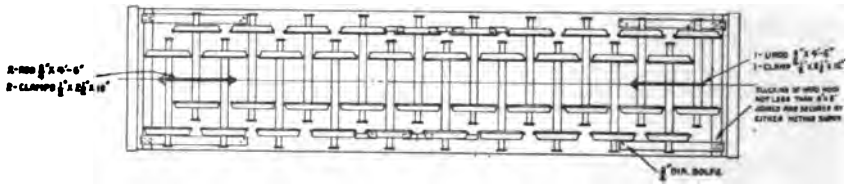
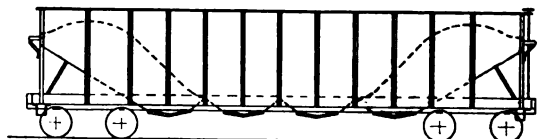


FIG. 66-C.

FIG. 66-D  
RULE 123-A

MANNER OF LOADING IRON ORE AND SIMILAR MATERIAL.



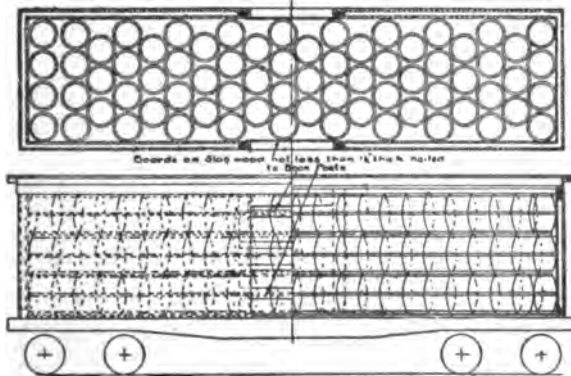
## RULES GOVERNING LOADING MATERIAL IN BOX AND STOCK CARS.

**NOTE.**—Where opportunity is provided, the lading should be inspected in transit.

124. Lading must be secured in closed cars so that it will not come in contact with side doors or roll and shift in transit. Cars equipped with protection slats nailed to outside of door posts or to doors will not be accepted. Cars without doors, and containing freight of a character requiring it, must have the lading protected from falling or rolling out of car by strips or slab wood, not less than  $1\frac{1}{2}$  inches thick at center, nailed to inside of door posts, and sufficiently close to floor of car and to each other to prevent lading from passing between them.

125. Barrels should be loaded in accordance with Fig. 67. If the

**Fig. 67.**



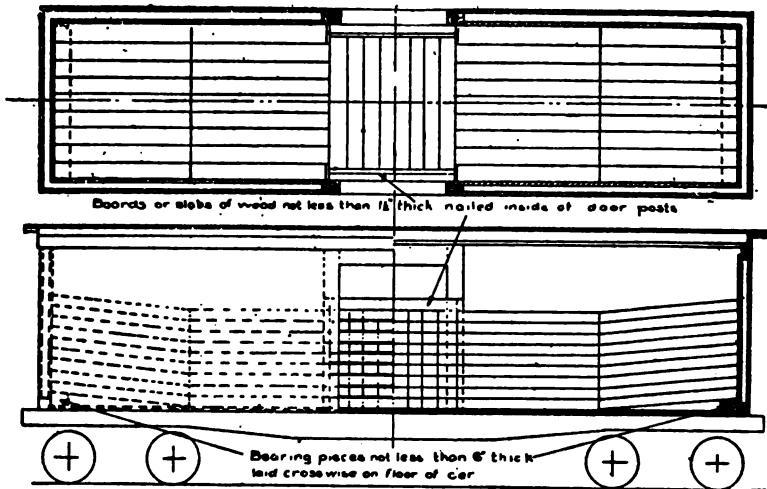
**Manner of Loading Barrels in Box or Stock Cars.**

barrels do not fully fill the space they should be chocked to prevent sliding and rolling.

126. Barrel staves, fence posts, wooden billets, lath, tan bark and similar short wood should be loaded in accordance with Figs. 68 and 68-A. If the pieces are tapered they must be loaded with tops and butts alternating. If loaded in accordance with Fig. 68, must be loaded longitudinally, except at door openings, where they must be placed crosswise. Good sound boards or slabs of wood not less than  $1\frac{1}{2}$  inches thick, spaced not more than  $2\frac{1}{2}$  inches apart, should be nailed across inside of door opening.

If, in accordance with Fig. 68-A, the outer ends of staves or similar short material, whatever it may be, but of a length permitting two piles to be loaded end to end in doorway and still be at least 10 inches inside of

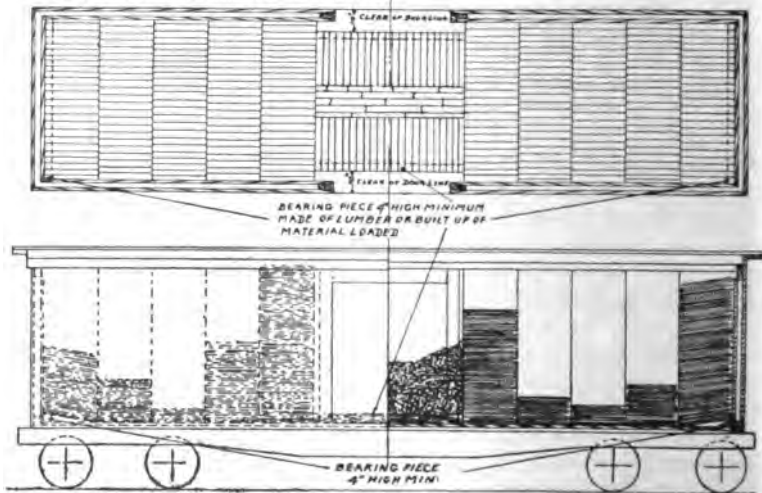
Fig. 68.



**Manner of Loading Ties, Fence Posts, Wooden Billets, Barrel Staves and Similar Short Wood in Closed Cars.**

FIG 68-A

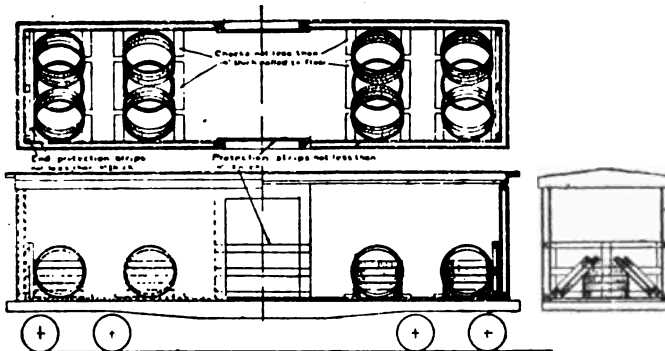
MANNER OF LOADING STAVES-FENCE POSTS-LATH-TAN BARK AND SIMILAR MATERIAL IN CLOSED CARS WITHOUT DOOR STRIPPING



door line, must rest on pieces not less than 4 inches thick laid lengthwise of door openings, in order to make the pile incline toward center of car. This method makes the stripping of door opening unnecessary.

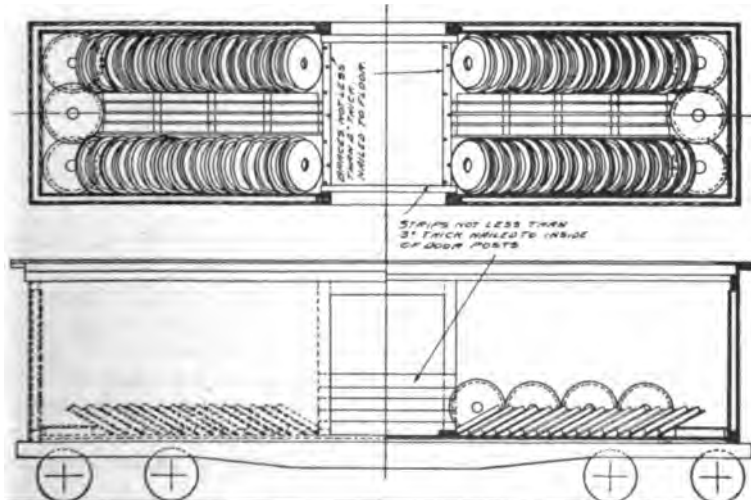
127. Hewed ties 8 feet or more in length, or sawed ties of lengths 8 to 12 feet, or similar material which does not conform to Rule 126, may be loaded longitudinally in four tiers, as per Fig. 71, in which case the

Fig. 69.



Manner of Loading Tires in Box or Stock Cars.

FIG 70.  
MANNER OF LOADING WHEELS IN CLOSED CARS.

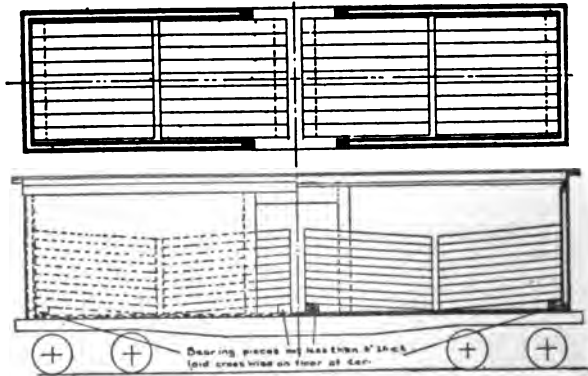


ends of the tiers next to the end of car and end of ties projecting into the doorway must rest on bearing-pieces not less than 6 inches thick laid cross-wise on floor of car. If the length of car is such that ties can not be piled in four tiers, three tiers may be used, as shown in Fig. 72, in which case the spaces between the ties must be blocked to prevent any shifting of the middle tier. When loaded in three or four tiers, as indicated, the door protection strips need not be applied.

127-A. Sawed ties more than 12 feet in length (see rules for loading lumber).

128. Tires must be loaded in piles, each pile consisting of tires laid on top of each other and inclined tires tipped against those lying flat, keying them in place as per Fig. 69. The bottom tire of each pile must be chocked to prevent sliding. The ends of car must be protected by boards or slab wood not less than 4 inches thick, extending from side to side of car and spaced not less than 4 inches from end sheathing by vertical pieces, to which the protection strips must be secured. The door openings must be protected by means of strips not less than 4 inches thick nailed to inside of door posts.

Fig. 71.

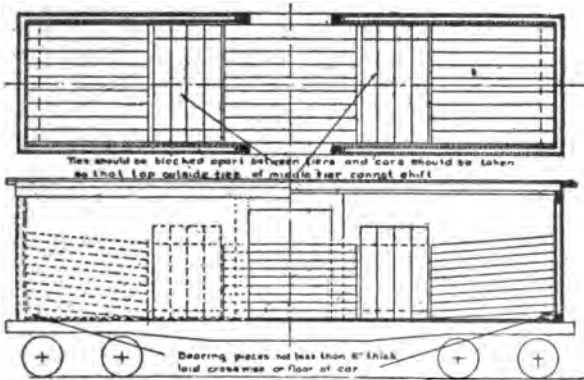


Manner of Loading Four Piles of Ties in Closed Cars

129. Car wheels should be loaded as per Fig. 70. At end of car the wheels should be laid flat, with flange upward; then two rows, one on each side of car, touching side lining and inclining toward center of car, should rest against those lying flat. The space between the two rows must be blocked apart either by wheels placed longitudinally or by means of chocks. Chocks not less than 4 inches thick should be used to block the wheels nearest center of car, and door openings must be protected by strips not less than 3 inches thick for door openings 6 feet or less in width, and 4 inches thick for door openings of greater widths, nailed to inside of door posts.

130. For all lading which will roll or easily slide, and not otherwise secured to prevent it from coming in contact with the door, the door openings must be protected with protection strips nailed on inside of door posts extending across the openings. Cars without doors must have the lading protected from falling or rolling out of car by door protection strips

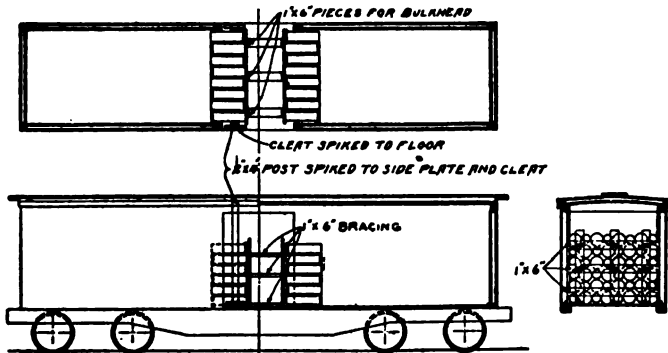
Fig. 72.



Manner of Loading Three Piles of Ties in Closed Cars.

Fig. 73.

MANNER OF LOADING SEWER PIPE IN CLOSED CARS.



secured in same manner. These strips are to be 6 inches wide by 1 inch thick or their equivalent, or slab wood not less than  $1\frac{1}{2}$  inches thick at center, spaced sufficiently close to floor of car and to each other to prevent lading passing between them, bulging the door and damaging door fastenings.

131. Material such as scrap junk, when loaded in stock cars, must have the spaces between the slats sufficiently sealed to prevent loss of material or ends of material working through the spaces.

132. Sewer pipe, drain tile, etc., in closed cars, should be loaded in tiers, separated by laths or similar material. The space between the tiers at door opening should be braced as per Fig. 73. When one-half or more of one length of pipe extends beyond door opening, such tier must be protected on each side by means of sound wood, 2 inches by 4 inches in section, or slabs, nailed to inside of plates and secured at floor by means of cleats spiked to floor of car. If full length of pipe extends beyond door openings, such tier must be protected by two pieces of 2 by 4 inch sound wood or slabs on each side, secured as specified above for single piece on each side.

To protect the ends of cars loaded with greased shaftings, boards two and one-half ( $2\frac{1}{2}$ ) inches thick, full width of car and to height of lading, should be securely nailed to end of car.

133. If box cars are used for loading heavy machinery, such as lathes, planers, boring machines, etc., each machine should be blocked by securely nailing to floor of car 2 by 4 inch hardwood strips fore and aft, to prevent shifting endwise.

## TANK CARS.

STANDARD.

In 1903 a report was submitted embodying certain specifications for the repairs of old equipment and the construction of new equipment. These specifications were submitted to letter ballot and adopted as a Recommended Practice.

In 1906 these specifications were modified; also, in 1907. In 1908 a further revision was made. In 1910 they were advanced to Standard.

In 1912 the specifications were rearranged and enlarged to include ordinary tank cars, old tank cars having wooden underframes, special tank cars for liquefied petroleum gas (casing-head naphtha) and special tank cars for liquid chlorine gas. In 1913 they were slightly modified to remove ambiguities.

The modified specifications are as follows:

## SPECIFICATION FOR TANK CARS.

### DEFINITIONS.

*Tank Car.* Any car to which one or more tanks, used for carrying liquids or compressed gases, are permanently attached.

Tank cars shall be divided into two classes: Ordinary and special.

*Ordinary Tank Car.* One used for the transportation of inflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 10 pounds per square inch. This class may also include cars for

the transportation of non-inflammable products, the vapor pressure of which, at a temperature of 100° F., does not exceed 25 pounds per square inch.

\* *Special Tank Car.* One used for the transportation of inflammable products, the vapor pressure of which, at a temperature of 100° F., may exceed 10 pounds per square inch.

#### GENERAL REQUIREMENTS.

(a) Tank cars offered for movement over the lines of a railroad must conform to the following specification.

(b) Designs for "special" tank cars must be submitted to the Master Car Builders' Association for approval.

(c) Tanks which bear evidence of damage by fire must be withdrawn from transportation service, provided, that where the damage to the tank is local only, or confined to a section which can be replaced, the railroad and the car owner may, after a joint inspection, agree that all damaged material shall be replaced and the tank made absolutely safe for transportation service; but before being returned to service, the tanks and fittings must be again submitted to the prescribed hydraulic test and properly stenciled.

#### SPECIFICATIONS FOR ORDINARY TANK CARS, OTHER THAN WOODEN

##### UNDERFRAME CARS.

1. No tank cars built hereafter shall be accepted for transportation unless equipped with steel underframing or with reinforced shell.

The design and construction of the car throughout must be at least as strong as the following detailed specifications.

2. Steel or iron tanks constructed subsequent to 1903 must be designed for a bursting pressure of not less than 240 pounds per square inch.

3. *Riveted Tank Seams.*—When riveted, all longitudinal and head seams must be double-riveted. Where head blocks are not used, head seams need not be double-riveted.

4. *Dome Heads and Covers.*—Dome heads and covers must be made of either cast or pressed steel, or of malleable iron.

The joint of the dome cap must be made tight against vapor pressure, and when necessary to insure this a satisfactory gasket must be used.

5. *Test.*—Tanks must be carefully inspected and tested with cold-water pressure at least once in ten years; with the exception that where tanks are used for carrying corrosive products, deterioration is to be expected in a shorter time, and the test period shall be reduced to five years. Products requiring this five-year period should include chemicals such as acids, ammonia liquors, and such other products as may be hereafter specified.

The test for tanks built prior to 1903 shall be at 40 pounds per square inch, and for tanks built since that date at 60 pounds per square inch, cold-water pressure, which they must stand without leak or evidence of distress.

The tank car owner shall be responsible for the proper carrying out of all tests and inspections.

Tanks when tested must be stenciled with date and place where test was made, and by whom, as follows:

Tested (date) .....  
 Pressure (pounds per square inch).....  
 At (place) .....  
 By (name of firm).....

6. *Safety Valves.*—By January 1, 1915, all tanks carrying products that give off volatile inflammable vapors at or below a temperature of 80° F., and having a vapor pressure of not more than 10 pounds per square inch at a temperature of 100° F., shall be equipped with 5-inch safety valves of approved design (Figs. 1 and 2), and these valves shall be set to open at a pressure of 12 pounds per square inch.

Provided, that where the lading is such as not to give off inflammable vapors (as determined by flash point from Tagliabue's open-cup tester as used for test of burning oils) at a temperature below 80° F., the setting of the 8-pound valves to 12 pounds may be deferred to such time as the valves require removal.

All required pressures for safety valves are subject to a tolerance of 1 pound above or below that specified.

One valve shall be provided for a capacity of 6,500 gallons or less, and two valves for a capacity of more than 6,500 gallons.

Where tanks carrying such products are divided into compartments, each compartment must be provided with a safety valve.

7. *Test of Safety Valves.*—All safety valves must be tested and adjusted, if necessary, by January 1, 1915, and at intervals of not over two years thereafter, and the date of the last test and pressure at which valve is set shall be plainly stenciled on the body of the valve, as follows:

Tested (date) .....  
 Pressure (pounds per square inch).....  
 At (place) .....  
 By (name of firm).....

The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure.

Valves improperly set, or not tested and stenciled at proper intervals, shall constitute defects for which owner shall be responsible.

8. *Five-inch Safety Vents with Lead Disks.*—Tank cars carrying volatile non-inflammable products whose vapor pressure at a temperature of 100° F. does not exceed 25 pounds per square inch, may be provided with vents depending on frangible lead disks for safety, which vents shall be of approved design, as shown by Fig. 3, or the disks to be of a thickness that shall insure rupture at a pressure not higher than 30 pounds per square inch.

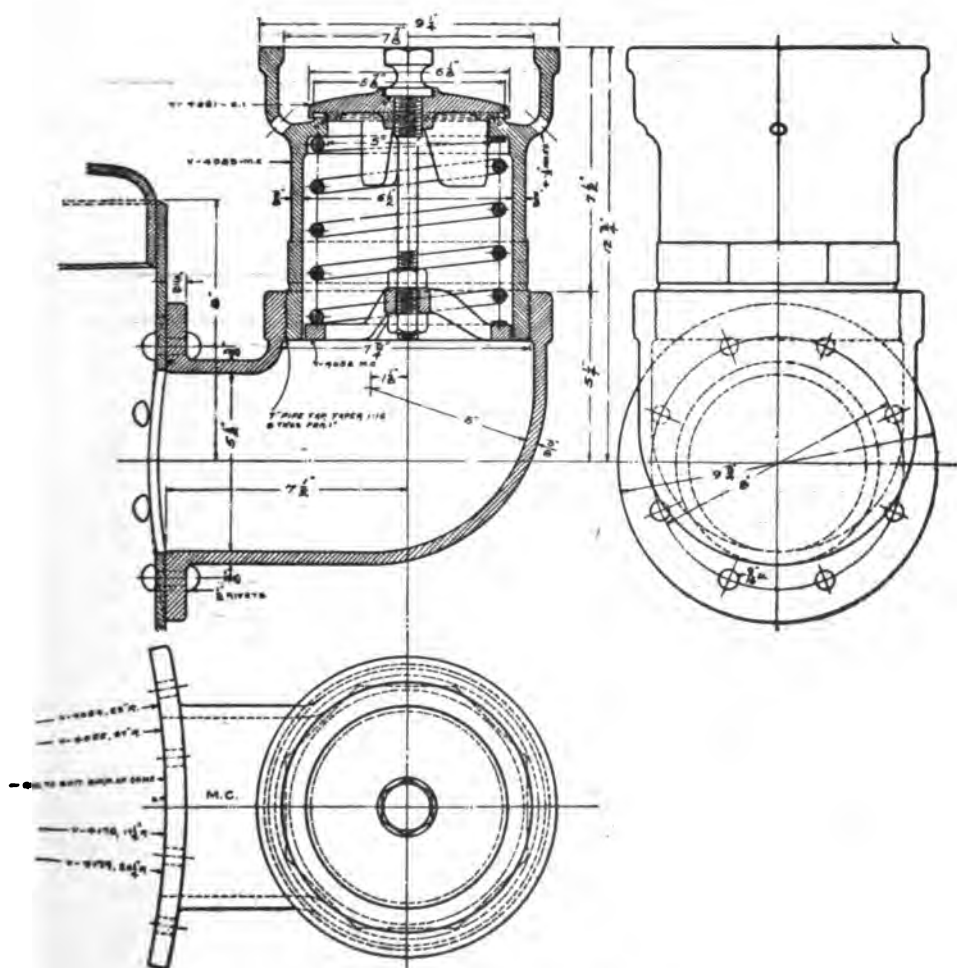


FIG. 1.—Standard 5-inch Safety Valve.

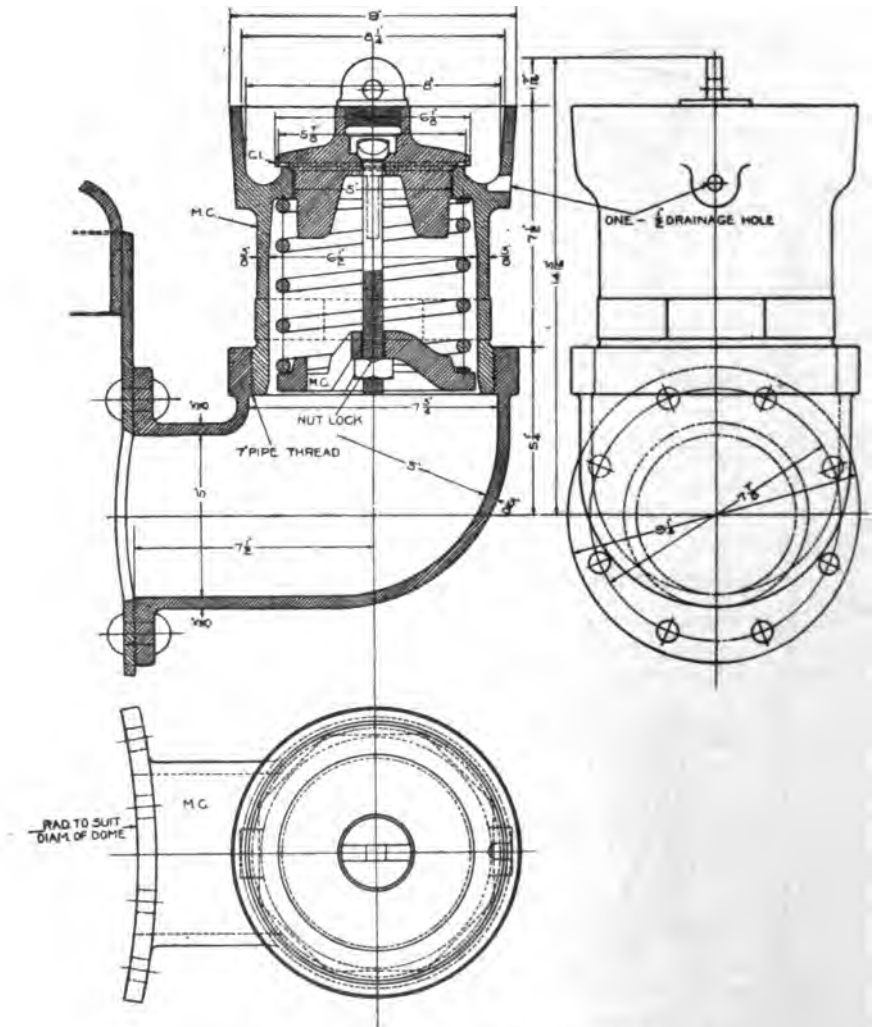


FIG. 2.—Alternative 5-inch Safety Valve.

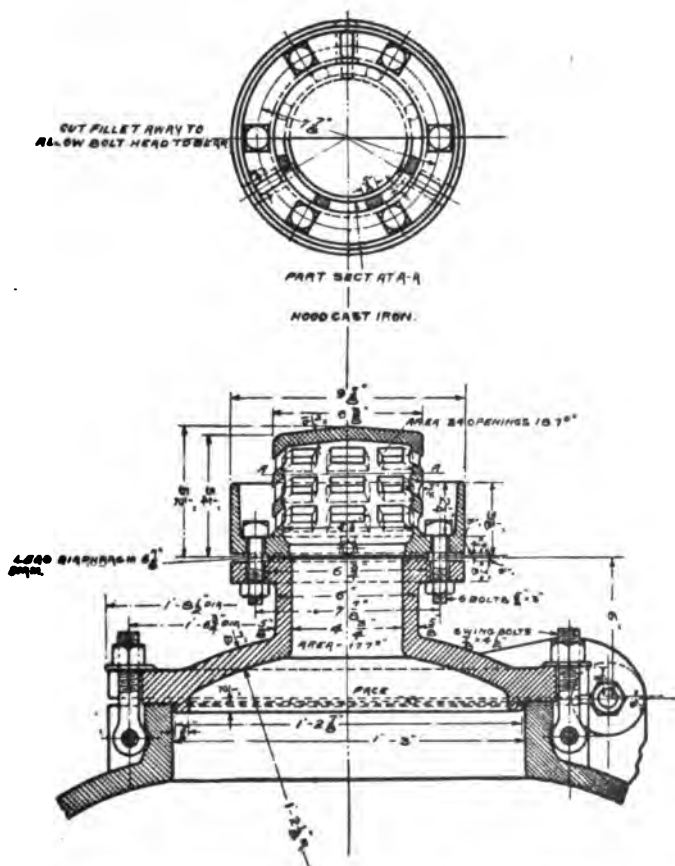


FIG. 3.—Five-inch Safety Vent with Lead Disk.

9. *Two-inch Vent Hole or Small Valve.*—Tank cars carrying non-inflammable or non-volatile material, such as sulphuric acid, vinegar, linseed oil, cottonseed oil, lard oil, fish oil, tannery products, glucose, molasses, calcium chlorid, caustic soda, silicate of soda, etc., need not be provided with 5-inch safety valves, but each tank must have a small open vent or valve, equal to not less than 2 inches in diameter (see Fig. 4).

If, for any reason, splashing of the liquid or contamination by moisture is to be avoided, a 2-inch vent with frangible lead disk, of a thickness which will insure rupture at a pressure not higher than 30 pounds, should be used in place of the 2-inch open vent (Fig. 4).

10. *Center Sills.*—The center-sill construction of the underframe between bolsters must have an effective cross-sectional area of at least 30 square inches, distributed as shown in Fig. 5, or equivalent.

11. *Bolsters, Draft Gear.*—Each car must be equipped with steel body and truck bolsters, steel couplers, and a draft gear of approved design, having a capacity of at least 60,000 pounds.

12. *Longitudinal Anchorage.*—Particular attention must be given to the longitudinal anchorage of the tanks, which must be thoroughly substantial, to prevent injurious end-shifting. The preferable method of securing tank against end-shifting is by anchoring the tank to the under frame at some one point, rather than by confining it between the head blocks, as the necessary play between tank and head blocks too often results in damage to the head, bending of the underframe at the bolsters and breakage of the discharge nozzles.

#### MINIMUM REQUIREMENTS FOR LONGITUDINAL ANCHORAGE OF TANK TO UNDERFRAME.

##### Tank connection:

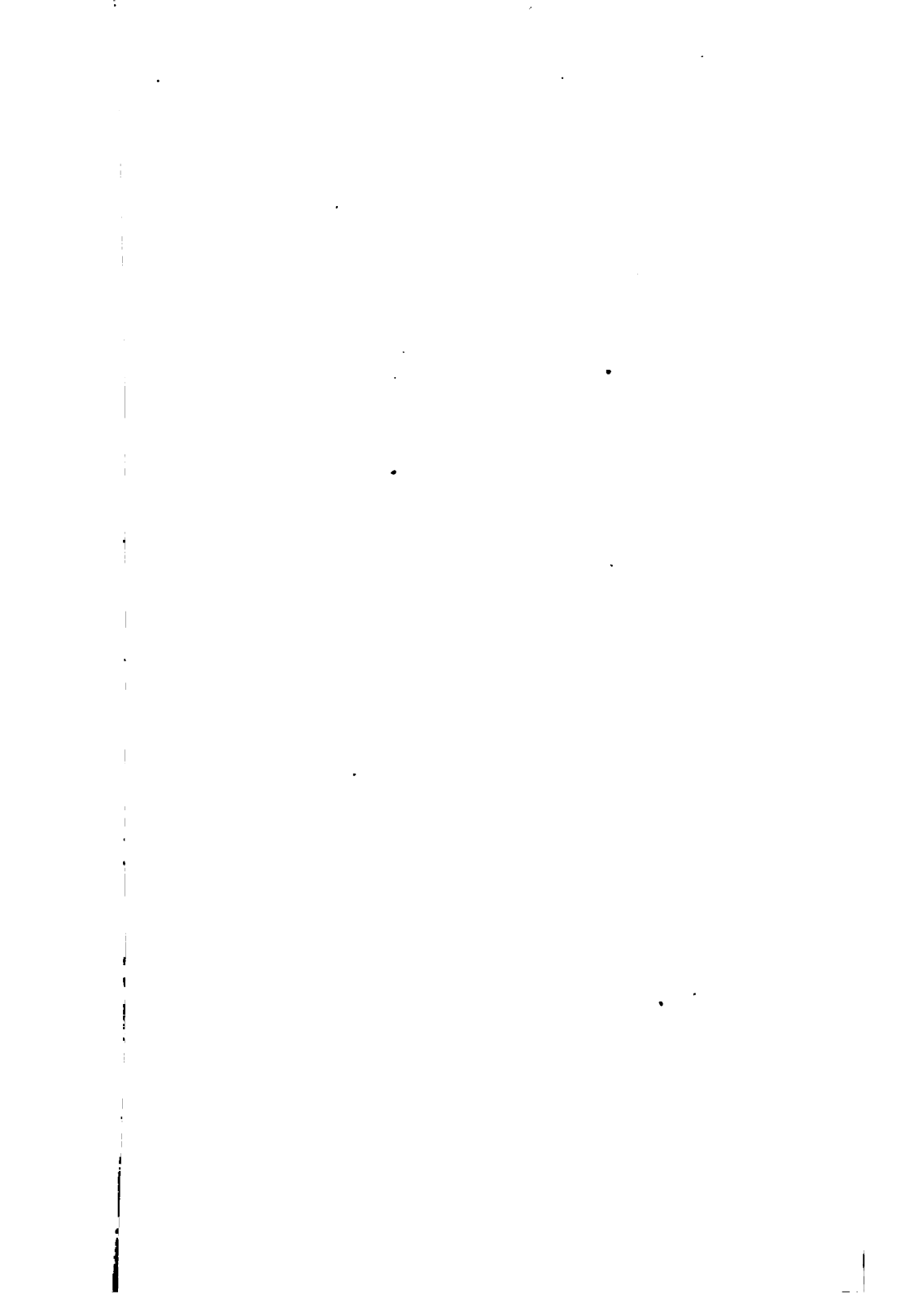
Shearing area of rivets, 25 square inches.....	{ For tanks of 8,500 gal- lons capacity or over.
Bearing area of rivets, 20 square inches.....	
Shearing area of rivets, 18 square inches.....	{ For tanks of less than 8,500 gallons capacity.
Bearing area of rivets, 14 square inches.....	

##### Frame connection:

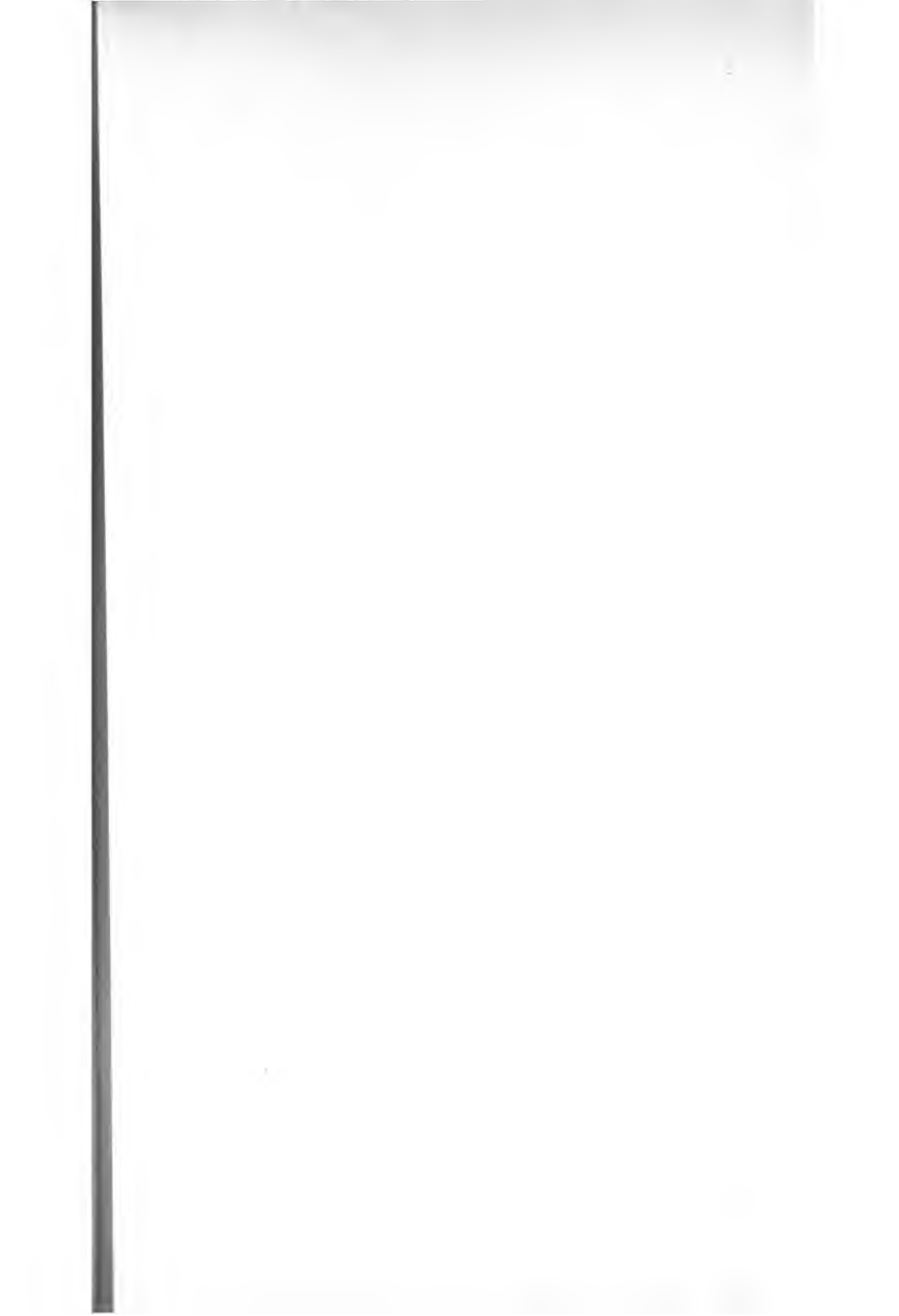
Shearing area of rivets, 12½ square inches.....	{ For tanks of 8,500 gal- lons capacity or over.
Bearing area of rivets, 10 square inches.....	
Shearing area of rivets, 9 square inches.....	{ For tanks of less than 8,500 gallons capacity.
Bearing area of rivets, 7 square inches.....	

13. *Dome Yokes, Tank Straps, Etc.*—Tanks must be secured from turning on the underframes either by means of an anchorage or by dome yokes, and must also be secured to underframe by means of tank straps, two for tanks not more than 76 inches in diameter, and four for tanks of greater diameter, or their equivalent.

The sectional area of dome yokes and tank bands must at no place be less than  $\frac{3}{4}$  of a square inch, or 1-inch round iron upset to  $1\frac{1}{8}$  inch at threaded end.









Cars having no underframe, with tank securely riveted to body bolsters, do not require dome yokes or tank bands.

Explanation: A threaded end,  $1\frac{1}{8}$  inch in diameter or more, with a body consisting of a flat band 2 by  $\frac{3}{8}$  inch, or equivalent section, or round iron 1 inch in diameter, will be accepted as meeting the requirements.

The dome yoke proper which passes around the dome may be a rod  $\frac{3}{4}$  inch in diameter, or its equivalent, to which is secured the strap or rod which is fastened to the underframe. The sectional area of dome-yoke strap must be the same as required for tank straps.

Where tanks are equipped with a greater number of tank bands than called for, the total sectional area of all bands will be considered as meeting the requirements, if they equal the total sectional area of the rods specified.

14. *Tank Valve Extension Clearance.*—Steel underframe tank cars in which the tank is secured from end-shifting by means of head blocks, must have a longitudinal clearance for tank valve extension of not less than 6 inches on each side of valve.

15. *Discharge Valve.*—If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve. Preferably the top of the discharge-valve handle should be within the tank, but in the event that it is carried through the dome, leaking must be prevented by packing and cap nut.

16. *Cars without Underframes.*—If the car has no underframe the tank shell at bottom must be at least  $\frac{5}{8}$  of an inch thick, and all circumferential seams in bottom sheet, except head seams, must be double-riveted.

17. *Brakes.*—Each car must be equipped with air brakes of a capacity equal to not less than 70 per cent of the light weight of car, and at least one hand brake operating the brakes of both trucks.

18. *Push-pole Pockets.*—There shall be a push-pole pocket at every corner of the car. Where, from the construction of the car, the push-pole pockets can not well be placed on the body, they must be applied to the trucks, so placed above the journal boxes that the push-pole will push toward the center of the truck.

19. *Trucks.*—Each truck must have a strength equal to or greater than the strength of the axles used.

20. All tank cars at home on a railroad must be inspected by inspectors in the employ of that railroad company, and when such tank cars meet the requirements herein set forth, the legend shown by Fig. 6 must be stenciled on each tank head, with the initials of the railroad company making such inspection and the date the inspection is made.

If foreign tank cars and individual tank cars at home on foreign lines, stenciled with the legend "M. C. B. Construction" by a foreign road, are

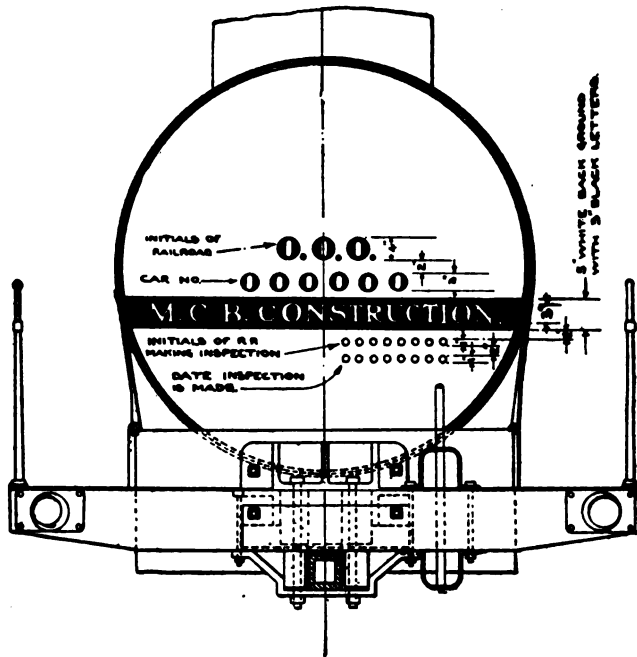


FIG. 6.—Legend to Show Compliance with M. C. B. Specification.

offered for movement over another railroad, and some of the details do not conform to the requirements of the tank-car specification, a report of same should be made through the proper officers to the official in charge of equipment, and the car allowed to proceed until further notice.

#### SPECIFICATION FOR OLD TANK CARS HAVING WOODEN UNDERFRAMES.

1. Tank cars having wooden underframes, of railroad or individual ownership, will be required to conform to the requirements of the "Specification for Ordinary Tank Cars," relating to test of tanks, safety valves, test of safety valves, 5-inch safety vents with lead disks, 2-inch vent hole or small valve with lead disk, dome yokes, tank straps, tank-valve extension clearance, discharge valve, brakes, push-pole pockets, trucks, etc., and inspection for compliance with M. C. B. specification, and, in addition, must be as strong as the construction covered by the following detailed specifications:

2. *Dome Heads and Covers.*—Where tank cars are fitted with cast-iron dome heads and covers not sufficiently strong to stand the necessary 40 pounds hydraulic test, they must be replaced by others of cast or pressed steel, or of malleable iron.

3. *Tank Heads.*—Tank heads less than  $\frac{7}{8}$  of an inch thick, bearing evidence of damage from impact with head blocks, should be reinforced at bottom by means of steel plate shoes  $\frac{3}{8}$  inch thick, riveted to head and shell.

4. *Center Sills.*—If cars are not equipped with intermediate sills, the underframes must have two center sills, each not less than 5 inches wide by 10 inches deep, or the equivalent in strength. If the car is equipped with intermediate sills, the center sills must not be less than 5 inches wide by 9 inches deep, or the equivalent in strength. Center sills must not be spaced more than 18 inches apart.

5. *Center Sill Filling Timber.*—Where draft timbers are underneath the center sills, the space between the center sills must be filled in with timbers not less in depth than center sills, extending from end sill to the center of nearest cross-bearer or cross-timber, provided the latter is located not less than 4 feet 6 inches from center of bolster. On cars where the draft arrangement is between center sills, the filler timber must be extended to the cross-tie timber when the cars go to shop for repairs to center sills. Center sills and filling timbers must be securely bolted together by means of  $\frac{3}{4}$ -inch bolts. On cars having center or intermediate sills not less than 10 inches wide by 10 inches deep, which may be made up of two 5 by 10 inch sills bolted together, the filling timbers may be omitted.

6. *End Sills.*—End sills not reinforced by buffer blocks must not be less than 9 inches wide by 10 inches deep. End sills 6 inches wide by 12 inches deep, reinforced with buffer blocks not less than 6 inches wide by 10 inches deep and of sufficient length to overlap center sills, will be acceptable as a substitute for 9 by 10 inch end sills.

On existing cars, if buffer blocks are used for the purpose of reinforcing end sills which do not come within the specified requirements, the buffer blocks in no case must be less than 4 inches thick nor end sills less than 6 inches thick. The total strength of the end sill and buffer block must be equal to the strength of the construction specified.

7. *Draft Timbers.*—Draft timbers secured to inside of center sills and extending to cross-bearer or cross-timber will be accepted as a substitute for filling timbers referred to above. Where center sills are 9 inches wide by 10 inches deep, or over, and draft timbers are placed between same, they need not extend farther back than body bolster, provided they are adequately secured to center sills by means of seven  $\frac{7}{8}$ -inch bolts or their equivalent, and butt against body bolster. Draft timbers located underneath the center sills must not be less than 4 inches wide by 8 inches deep, and each draft timber must be held to center sills, end sills and buffer blocks by means of seven or more  $\frac{7}{8}$ -inch bolts or six 1-inch bolts. Where an arrangement for supporting draft timbers is substituted for one or more bolts and the construction is of equal strength, the same will be acceptable. Draft timbers extending beyond bolster must be secured to center sills by additional bolts.

8. *Draft Gear.*—The draft gear and draft attachments must be at least as strong as the design shown in Fig. 7.

Cars should be provided with draft-gear stops gained into draft timbers or heeled on end sills, filler timber or body bolster, and secured with five  $\frac{3}{4}$ -inch bolts; but cars having stops gained into draft timbers or heeled on end sills, filler timber or body bolster, secured with three  $\frac{3}{4}$ -inch bolts, may be continued in service until such time as they go to shop for repairs, when five bolt stops must be provided.

In all cases, tail yokes or attachments of equal strength must be used. Tail bolts, tail straps, or American continuous draft gear, will not be accepted.

9. *Head Blocks.*—Head blocks must not be less than 10 inches wide unless reinforced by metal plates, and of sufficient depth to extend at least 6 inches above bottom of tank, and may be made of two pieces bolted together and bolted to underframe by means of not less than four  $\frac{7}{8}$ -inch vertical bolts. They must be cut out to suit curve of tank. The ends of each head block should preferably be tied to corresponding end of head block at the other end of car by means of rods not less than 1 inch in diameter, with  $1\frac{1}{8}$ -inch threaded ends, and each head block supported at center by means of a substantial casting securely bolted to end and center sills. Where the construction of the car does not permit of this fastening, the following may be substituted:

The ends of each head block tied to corresponding end of head block at the other end of car by rods not less than 1 inch in diameter, with  $1\frac{1}{8}$ -inch threaded ends, and each head block secured by two stay rods 1 inch in diameter anchored to center sills;

Or, head block supported at center by means of a substantial casting securely bolted to end and center sills and two 1-inch rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods  $1\frac{3}{8}$  inches in diameter, anchored to center sills;

Or, head block secured by two stay rods 1 inch in diameter, anchored to center sills, and two 1-inch rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods 1 inch in diameter, anchored to center sills, and two straps not less than  $\frac{3}{4}$  inch thick and 3 inches wide, passing over head blocks and securely fastened to underframe.

#### SPECIFICATION FOR SPECIAL TANK CAR FOR CARRYING VOLATILE INFLAMMABLE PRODUCTS WITH A VAPOR TENSION OF OVER TEN POUNDS PER SQUARE INCH AT A TEMPERATURE OF 100° F.

1. *Tanks.*—For these cars the tanks may be either welded or riveted; with or without steel underframes. The welded tank is preferred on account of tightness.

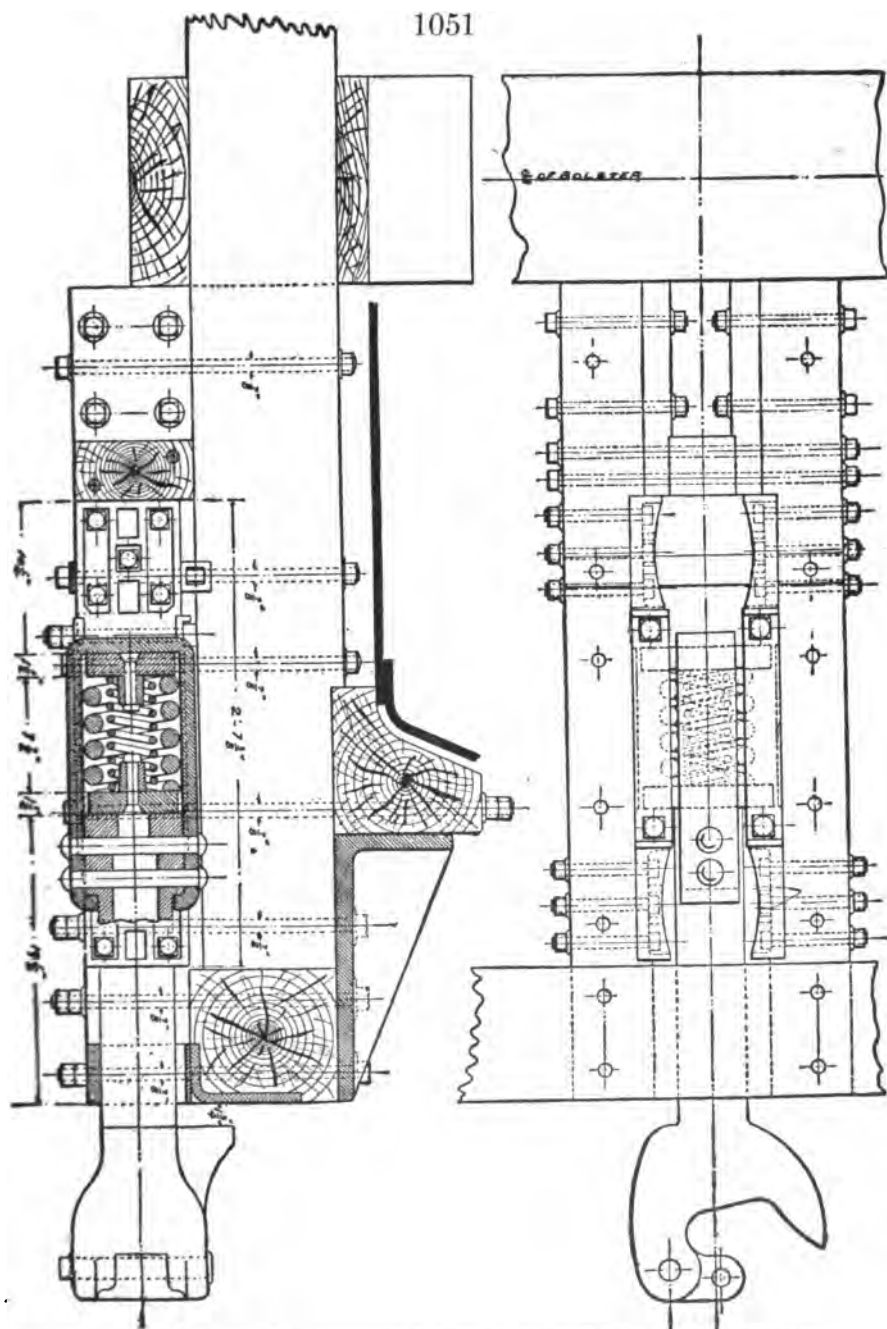


FIG. 7.—Minimum Requirements for Tank Cars with Wooden Underframe.

Where riveted tanks are used, all longitudinal and head seams must be double-riveted.

Heads must be not less than  $\frac{1}{2}$  inch thick; and if head blocks are used, heads must not be less than  $\frac{5}{8}$  inch thick.

2. *Domes*.—Domes of steel plate, preferably drawn without vertical seams, riveted or welded to the shell proper.

Dome must have a capacity to provide for an expansion of  $3\frac{1}{2}$  per cent of the contents of the tank, measuring from the inside top to shell to the top of the dome.

Cover for dome may be secured either by screw joint, by bolting, or by yoke with center screw. Lid must be provided with suitable gasket to insure tightness against the escape of gas under pressure.

3. *Safety Valves*.—The safety valves to be of the same pattern as those used for other inflammable products, set to blow at a pressure of 20 pounds gauge pressure, with a tolerance of 1 pound above or below that pressure.

4. *Test of Safety Valves*.—The safety valves must be tested and adjusted, if necessary, at intervals of not over six months, and the pressure and date of the last test shall be plainly stenciled on the body of the valve, as follows:

Tested (date) .....  
 Pressure (pounds per square inch) .....  
 At (place) .....  
 By (name) .....

The test may be made without the removal of the valve from the car; provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by 20 pounds.

Valves improperly set, or not tested at proper intervals and stenciled, shall constitute defects for which the owner shall be responsible.

5. *Lagging of Tank*.—The barrel, ends and dome to be lagged with a thickness of 2 inches of 85 per cent carbonate of magnesia, or its equivalent, covered with sheet-iron jacket  $\frac{1}{8}$  inch thick. Tank before lagging to be well painted. The sheets of the jacket to be lapped so as to shed rain and maintain the dryness of the lagging.

6. *Test of Tank*.—Tank to be tested before being put into service and once every two years thereafter with a cold-water pressure of 100 pounds per square inch, which it must stand without leakage or evidence of distress.

The tank car owner shall be responsible for the proper carrying out of all tests and inspections. Tanks, when tested, must be stenciled with pressure, date and place where test was made, and by whom, as follows:

Tested (date) .....  
 Pressure (pounds per square inch) .....  
 At (place) .....  
 By (name) .....

7. If discharge valves are used, the valves must be so located that breakage of the connection pipe will not unseat the valve. Preferably the top of the discharge-valve handle should be within the tank, but in the event it is carried through the dome, leakage must be prevented by packing and cap nut. An alternative arrangement, by which the valve is placed on top of the car and the contents of the car discharged by air, will be accepted.

8. *Stenciling.*—In some convenient location on either the sides or the ends of the car shall be stenciled the words: "For Liquefied Petroleum Gas."

On the side of the dome shall be stenciled: "Caution: Liquefied Petroleum Gas (Casing Head Naphtha): Before removing manhole cover, safety valve must be lifted and held open until the internal pressure, if any, is relieved."

9. All other requirements for these special tank cars to be the same as those for "Ordinary Tank Cars."

10. The designs for these "Special Tank Cars" to be submitted to the Master Car Builders' Association for approval.

#### SPECIFICATION FOR SPECIAL TANK CAR FOR TRANSPORTATION OF LIQUEFIED CHLORINE GAS.

1. Liquefied chlorine gas may be shipped in a lagged tank car of approved design, which shall be tested before being put into service with a cold-water pressure of 300 pounds per square inch, and stenciled in accordance with the requirement in this respect of the specification for ordinary tank cars.

2. Car shall be provided with an approved design of small safety valve and fusible seal, which must be so located that in case the car became involved in a fire the seal would be exposed.

3. The designs for these "Special Tank Cars" to be submitted to the Master Car Builders' Association for approval.

#### HIGH SPEED FOUNDATION BRAKE GEAR FOR PASSENGER SERVICE.

#### RECOMMENDED PRACTICE.

Sheets M. C. B. — J, K & L.

In 1903 the schedules for high speed foundation brake gear, as shown on Sheets M. C. B. — J, K & L, were adopted as Recommended Practice. Fig. B. C. 7—A was modified in 1907. In 1912 the drawings were revised to permit the hand and power brake to work in harmony. In preparing these schedules the following fundamentals of design were adopted:

#### FUNDAMENTALS.

Following are the fundamentals of the design:

Braking power to be 90 per cent of the light weight of the car.

Equalized pressure in brake cylinder, sixty pounds per square inch.

Maximum pressure in brake cylinder, eighty-five pounds per square inch.

Maximum stress in levers, 23,000 pounds per square inch.

Maximum stress in rods, except jaws, fifteen thousand pounds per square inch; no rod to be less than  $\frac{7}{8}$  inch in diameter.

Maximum stress in jaws, ten thousand pounds per square inch.

Maximum shear on pins, ten thousand pounds per square inch.

Diameter of pins to provide a bearing value not to exceed 23,000 pounds per square inch.

The reduction of stresses in rods, levers and jaws due to friction of the foundation brake, and the reduction of braking power due to the same cause and to the action of release springs should be neglected, because it is considered to be too difficult to determine their value even with a fair degree of accuracy.

#### SIX-WHEEL TRUCKS.

The committee submits Plate K, schedule "A-1," herewith for cars weighing 80,000 to 100,000 pounds and having six-wheel trucks, and schedule "A" for cars weighing 100,000 to 137,000 pounds and having six-wheel trucks; the difference between these schedules is that a sixteen-inch brake cylinder is to be used for schedule "A" and a fourteen-inch brake cylinder is to be used for schedule "A-1," otherwise they are the same. The location of the fulcrum hole in the cylinder lever is made to vary by quarters of the inch to suit the weight of the cars, but only one fulcrum hole shall be drilled in each lever.

With schedule "A" there should be used a brake suitable for a load of 28,000 pounds, and with schedule "A-1" there should be used a brake beam suitable for a load of 22,000 pounds imposed at the middle of the beam.

#### FOUR-WHEEL TRUCKS.

Plate L, schedule "B-1," submitted herewith, is for cars weighing 50,000 to 70,000 pounds and having four-wheel trucks, and schedule "B" is for cars weighing from 70,000 to 90,000 pounds and having four-wheel trucks, the differences between the two being that a fourteen-inch brake cylinder is to be used with schedule "B," cars weighing 70,000 to 90,000 pounds, and a twelve-inch brake cylinder is to be used with schedule "B-1," cars weighing 50,000 to 70,000 pounds; also that with schedule "B" there should be used a brake beam suitable for a load at the middle of 28,000 pounds, the same as for schedule "A," and with schedule "B-1" there should be used a brake beam suitable for a load at the middle of 22,000 pounds, the same as for schedule "A-1."

The proper braking power for the weight of car is obtained by the location of fulcrum hole in the cylinder lever.

Plate M, schedule "C," was designed for cars weighing 50,000 pounds and less and equipped with four-wheel trucks. A ten-inch brake cylinder is to be used with this schedule and a brake beam suitable for a load at the middle of 15,200 pounds.

## DESIGNATION OF RODS AND LEVERS.

On the drawings, the location of levers and rods are designated by letters, the first letter in the designation distinguishes between body and truck. The second letter distinguishes between the levers and the connections. The figure following the second letter is the distinctive number for the lever or connection; and following this figure is the schedule letter to which the lever or connection belongs. Thus B-C<sub>2</sub>-B means body connection number two (second from cylinder piston rod), of schedule "B"; also T-L<sub>2</sub>-B would mean truck lever number two for schedule "B."

## STENCILING LIGHT WEIGHT OF CAR.

## RECOMMENDED PRACTICE.

The light weight of car should be stenciled on each car. The cross frame tie, when exposed, furnishes a convenient place on which to show the weight, but when this place is not available some other means should be provided. In addition to this the length of the cylinder end of the cylinder lever should be shown so that no calculation would be necessary to determine the proper cylinder lever for the car.

## MARKING LEVERS.

It may be found desirable by some railroad companies to mark each lever in a manner to indicate the schedule to which each belongs and the location of each in the brake rigging, and if this is done it is suggested that the marking be the same as indicated on the drawings.

TABLE I.

Schedule Designation.	Light Weights of Cars. (Lbs.)	Type of Truck.	Size of Brake Cylinder.	Maximum Load at Middle of Brake Beam.
A.	{ 100,000 to 137,000	{ 6-wheel	16 inches	28,000 lbs.
A-1.	{ 80,000 to 100,000	{ 6-wheel	14 inches	22,000 lbs.
B.	{ 70,000 to 90,000	{ 4-wheel	14 inches	28,000 lbs.
B-1.	{ 50,000 to 70,000	{ 4-wheel	12 inches	22,000 lbs.
C.	{ 50,000 and less.	{ 4-wheel	10 inches	15,200 lbs.

There have been brought together in Table I the distinctive data of each schedule so that by referring to the table there can be found quickly the correct schedule for any particular car.

## STEAM AND AIR CONNECTIONS FOR PASSENGER CARS.

## STANDARD.

In 1912 the following items were transferred to standard:

Two-inch train line.

End valves with not less than  $1\frac{1}{2}$ -inch openings.

## STEAM AND AIR CONNECTIONS FOR PASSENGER CARS.

## RECOMMENDED PRACTICE.

Sheet M. C. B.—Q<sup>1</sup>.

In 1903 the following specifications for steam and air line connections were adopted as Recommended Practice:

Steam hose,  $1\frac{3}{8}$ -inch inside diameter and of such length as to provide 31 inches from face of coupling gasket to end of hose nipple;  $1\frac{1}{2}$ -inch steam hose couplings of dimensions to agree with those shown on Plate Q, with gaskets having  $1\frac{1}{2}$ -inch diameter opening, gaskets to be so constructed that the normal diameter of opening will always be maintained; couplings not provided with gravity traps; inlet valves to have reduced openings which should be as small as possible and maintain the volume of steam required by the radiating pipes for the severest weather conditions.

That the steam-heat, air-brake and air-signal connections be located as shown on Plate Q herewith.

That the air-brake and air-signal hose should be 1 inch in diameter and 22 inches long.

In 1911 the above dimensions were changed to read: Air-brake hose must be  $1\frac{3}{8}$  inches inside diameter and 22 inches long, and the air-signal hose must be 1 inch inside diameter and 22 inches long.

In 1911 the angle cock was changed to show 30 degrees from the vertical.

In 1912 the 2-inch train line was adopted as standard.

In 1912 end valves with not less than  $1\frac{1}{2}$ -inch opening was adopted as standard.

In 1911 the steam and air connections were erroneously shown as standard. In 1912 they were changed to recommended practice and illustrated on Sheet M. C. B.—Q. Changed to Sheet M. C. B.—Q<sup>1</sup> in 1913.

## STEAM HOSE, SPECIFICATIONS FOR.

## RECOMMENDED PRACTICE.

In 1913 the following specifications for steam hose for passenger equipment cars were adopted as Recommended Practice:

## SPECIFICATIONS FOR STEAM-HEAT HOSE FOR PASSENGER EQUIPMENT CARS.

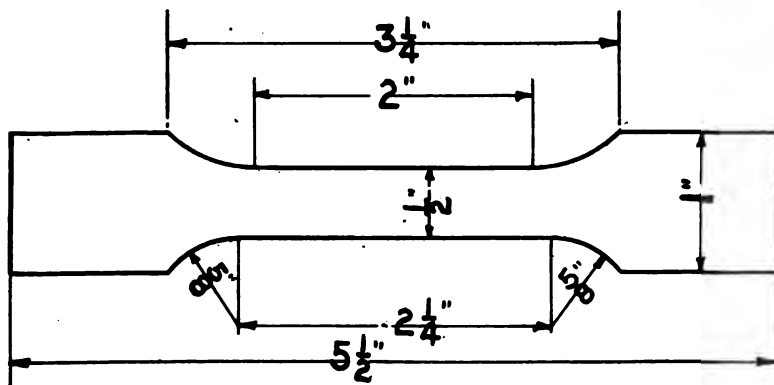
## I — MANUFACTURE.

Steam-heat hose must be composed of a tube of rubber, wrapped with five-ply cotton fabric and the whole covered with rubber.

## 2 — PHYSICAL PROPERTIES AND TESTS.

The railway company's inspector will select for test one piece at random from each lot of 201 pieces. When this hose is received at the test laboratory, a section  $2\frac{1}{2}$  inches long will be cut from one end in order to determine the friction, tensile strength and elongation. The remaining portion will then be subjected to steam heat in the digester. After this section has been heated another section  $2\frac{1}{2}$  inches long will be cut from it and used to ascertain the friction, tensile strength and elongation, in order to show the change in these characteristics due to the action of heat.

**FRICTION TEST BEFORE STEAMING.**— A section 1 inch long will be cut from the hose and supported in such a manner that it will turn freely on its axis. A twenty-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.



## TENSILE SPECIMEN.

FIG. 1.

**TENSILE TEST BEFORE STEAMING.**— A strip cut from the tube with a die or other suitable means to the dimensions shown in Fig. 1 will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 600 pounds per square inch and the elongation of the 2-inch section at the time of fracture must not be less than 6 inches.

**FRICTION TEST AFTER STEAMING.**— A section 1 inch long will be supported in such a manner that it will turn freely on its axis. A fifteen-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.

**TENSILE TEST AFTER STEAMING.**—A strip cut from the tube with a die or other suitable means to the dimensions shown in Fig. 1 will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 450 pounds per square inch, and the elongation of the 2-inch section at the time of fracture must not be more than 8 inches or less than 4 inches.

### 3 — SIZE AND DIMENSIONS.

	Maximum, Inches.	Minimum, Inches.
Length .....	24 $\frac{1}{4}$	23 $\frac{3}{4}$
Inner diameter .....	....	....
Outer diameter .....	....	....
Thickness of tube.....	....	$\frac{1}{8}$
Thickness of cover.....	....	$\frac{1}{16}$

### 4 — WORKMANSHIP.

**TUBE.**—The tube should be composed of at least two calendars of rubber. It must be free from holes, bits of wood, bark, sand and other foreign matter, and from other imperfections. It must be so firmly joined to the fabric that it can not be pulled off without tearing it.

**FABRIC.**—The fabric must be of duck, with the warp containing not less than 27 strands, 3 threads per strand, and the filler 18 strands and 4 threads per strand. It must be frictioned on both sides and have, in addition, a distinct layer of rubber on one side, readily visible between the plys when the finished hose is cut open.

**COVER.**—The material of the cover should be a rubber compound which has good weather-resisting qualities, as firmly attached to the fabric as is the tube, and to be equally free from defects. The end of the hose should be cut off true to length, but shall not be capped.

### 5 — MARKING.

**SERIAL NUMBER.**—Each lot of 200 hose or less must bear the manufacturer's serial number, beginning with one on the first of each year and continuing consecutively until the end of the year. Serial numbers of hose which are rejected must not be used again. With each lot of 200 hose or less, one extra piece of hose must be furnished free of cost.

**LABEL.**—Each piece of hose must have securely vulcanized to it a label of white or red rubber, as shown herewith.

<b>A.B.C. ROAD</b>		<b>11 — 6</b>	
<b>NAME OF MANUFACTURER</b>	<small>COPYRIGHTED</small>	<b>SERIAL NUMBER</b>	

## 6—INSPECTION.

**REJECTION.**— If the sample fails to pass the above tests, the lot represented by it will be rejected and the same serial number must not be applied to any other steam hose during the same calendar year.

**INSPECTION.**— If the sample passes all the tests, all pieces represented by it will be accepted if free from injurious mechanical defects.

Rejected hose will be returned at the expense of the manufacturer.

**STEAM-HOSE COUPLINGS.****RECOMMENDED PRACTICE.**

Sheet M. C. B.—Q<sup>1</sup>.

In 1913 the following specifications for steam-hose couplings were adopted as Recommended Practice:

**STEAM-HOSE COUPLINGS.**

1. Coupling contour to be such that coupling will interchange with the coupler as shown on Fig. 3.
2. Coupler must have a locking attachment which will securely lock the two couplers together without depending on the hose in any way.
3. The angle of the nipple to a line perpendicular to the coupling face of the coupling should not be less than 20 degrees.
4. The coupler should be of the two-piece type, having the nipple separate and screwed into the coupler head with 1½-inch pipe thread. The nipple shall be of the type having a shoulder to engage clamp-nipple shown on Fig. 4.
5. The clamp shall be of the two-piece type, as shown on Fig. 5.
6. The minimum diameter of hose through gasket to be 1⅞ inches.
7. Gaskets shall be flat face, securely held in place in coupler head, but so designed that they can be removed and replaced without removing hose or coupler head from car.

In 1913 it was adopted as Recommended Practice that no pipe having an internal diameter less than that of 1-inch standard weight be used on passenger cars, and that on all new equipment 1¼-inch extra-heavy pipe be used.

In 1913 the position of bolting lugs on hose clamps at nipple and coupling ends, as shown on Sheet Q<sup>1</sup>, was adopted as Recommended Practice.

**PERMANENT STAKE POCKETS.****RECOMMENDED PRACTICE.**

In 1905, as a result of letter ballot, the following Recommended Practice was adopted regarding Permanent Stake Pockets:

1. That the method of securing permanent stake pockets to cars of wooden construction be by U bolts.

2. That the method of securing permanent stake pockets to cars of steel construction be by rivets or U bolts.

3. That malleable iron be used in the manufacture of permanent stake pockets.

4. That stakes should be located to suit the construction of the car or the requirements of the service, but should not be placed farther apart than 4 feet from center to center.

#### TEMPORARY STAKE POCKETS.

#### RECOMMENDED PRACTICE.

In 1905, as a result of the letter ballot, the following dimensions were adopted as Recommended Practice for Temporary Stake Pockets:

For flat cars and gondola cars with sides less than 30 inches high, 4 inches wide by 5 inches deep.

For gondola cars with sides 30 inches and over, 4 inches wide by 4 inches deep.

#### LONGITUDINAL SPACING OF TEMPORARY STAKE POCKETS.

#### RECOMMENDED PRACTICE.

##### Sheet M. C. B.—E.

In 1906 a plan for longitudinal spacing of temporary stake pockets for gondola cars was adopted as Recommended Practice.

#### BOX CAR SIDE DOOR FIXTURES.

#### STANDARD.

##### Sheets M. C. B. 30 and 30-A.

In 1897 a committee on this subject reported with details which were afterward adopted by letter ballot as Recommended Practice of the Association. See Sheet M. C. B.—F. Proceedings 1897, page 186.

In 1910 the outside hung side door, shown on Sheet M. C. B.—F, and flush side door, shown on Sheet M. C. B.—F1, were adopted as Recommended Practice as representing the minimum requirements in door construction and details shown.

Also that the door hood coverings be omitted from new cars, and as much as possible in repairs to old cars.

In 1911 the location of center of hasp or sealing eye was made preferably 5 feet from top of rail and not more than 5 feet 9 inches from top of rail.

In 1912 the door hasp staple was increased from 5¾ inches to 16 inches and provided with four bolt holes.

In 1912 the drawings and details were advanced to standard.

#### BOX CAR END DOOR FIXTURES.

#### RECOMMENDED PRACTICE.

##### Sheet M. C. B.—F.

In 1912 the box car side door fixtures were transferred to standard, the end door fixtures remaining as a recommended practice.

**SEAL RECORDS OF BOX-CAR END DOORS.****RECOMMENDED PRACTICE.**

In 1913 the following recommendations were adopted:

End doors used for loading lumber in box cars are essential only on roads having long lumber loading in box cars as an essential feature of traffic.

End doors must be so constructed that when closed they lock automatically by means of a lock accessible from the inside of the car, thus avoiding the necessity of taking seal records.

Seal appliances now in use, and not accessible from the ground or from end ladders, should be revised so as to be accessible from the ground or end ladders, to promote the safety of employees.

**ROUNDING CORNERS OF DOORS, DOOR JAMBS AND ALL OTHER  
INSIDE EXPOSED CORNERS OF STOCK CARS.**

**RECOMMENDED PRACTICE.**

Sheet M. C. B.—F.

In 1910 a Recommended Practice was adopted that doors, door jambs and all other inside exposed corners of stock cars be rounded to prevent injury to cattle.

**LIMIT GAUGES FOR ROUND IRON.****RECOMMENDED PRACTICE.**

In 1893 limit gauges and diameters for round iron were adopted as a Recommended Practice; these had formerly been Standard of the Association. See Proceedings 1883, pages 37 and 38, 116-118; Proceedings 1893.

In 1911 the limiting dimensions for  $1\frac{1}{2}$  inch and  $1\frac{3}{4}$  inch round iron were modified and limits for  $1\frac{3}{4}$  inches and larger sizes added.



FIG. 18.

Limit gauges such as shown herewith for  $1\frac{3}{4}$ -inch iron are recommended for use in procuring round iron to take the Sellers' standard

screw threads; round iron used to be of such size as will enter the large or + end of the gauge intended for that size, in any way, and also of such size as will not enter the small or — end in any way.

The limiting diameters for certain nominal sizes of iron, together with the maximum variation allowable by such use of these gauges, are given in the following table:

SIZES OF LIMIT GAUGES FOR ROUND IRON.

NOMINAL DIAMETER OF IRON.—INCHES.	Large Size, + end. Inches.	Small Size, — end. Inches.	Total Vari- ation Inches.
$\frac{1}{8}$ .....	.2550	.2450	.010
$\frac{1}{4}$ .....	.3180	.3070	.011
$\frac{3}{8}$ .....	.3810	.3690	.012
$\frac{1}{2}$ .....	.4440	.4310	.013
$\frac{5}{8}$ .....	.5070	.4930	.014
$\frac{3}{4}$ .....	.5700	.5550	.015
$\frac{7}{8}$ .....	.6330	.6170	.016
$\frac{1}{2}$ .....	.7585	.7415	.017
$\frac{1}{2}$ .....	.8840	.8660	.018
1 .....	1.0095	.9905	.019
$1\frac{1}{8}$ .....	1.1350	1.1150	.020
$1\frac{1}{4}$ .....	1.2605	1.2395	.021
$1\frac{3}{8}$ .....	1.3860	1.3640	.022
$1\frac{1}{2}$ .....	1.5115	1.4885	.023
$1\frac{5}{8}$ .....	1.6370	1.6130	.024
$1\frac{3}{4}$ .....	1.7625	1.7375	.025
$1\frac{7}{8}$ .....	1.8880	1.8620	.026

Round iron 2 inches in diameter and over should be rolled to nominal diameter.

#### COLLECTION OF SALT-WATER DRIPPINGS.

#### RECOMMENDED PRACTICE.

In 1898 the subject of rust on trucks and track from salt-water drippings from refrigerator cars was discussed, and a Recommended Practice for the collection of such drippings was adopted.

In 1910 this practice was modified as follows:

1. All salt-water drippings should be retained in the ice tanks and drained off only at icing stations.
2. The total capacity of drain openings should not exceed the capacity of traps, and the capacity of both drains and traps should be sufficient to release all drippings within the time limit of icing the train.
3. The mechanism adopted for handling drain valves should be simple and positive, and so designed as to insure closing the valves before hatch plugs can be returned to their places.
4. Salt drippings should be conducted from ice tanks through the drain valves above described and thence to the outside of cars through the regular traps and drain pipes.

## REFRIGERATOR CARS.

## HEIGHT OF FLOORS.

## RECOMMENDED PRACTICE.

In 1911 a uniform height of refrigerator cars from rail to top of floor was adopted as follows:

Inasmuch as the heights of freight-house platforms of the largest roads and packing houses vary in height from 42 to 44 inches above the rail, and as the American Railway Engineering and Maintenance of Way Association had not adopted any standard height of freight-house platforms, that this Association adopt a minimum of 48 inches as the Recommended Practice of height of refrigerator car floors, and that the Maintenance of Way Association be requested to adopt a maximum height of 44 inches, which will make ample allowance between the bottom of refrigerator car doors and top of platforms to avoid any trouble opening doors at freight houses.

## ICE TANKS.

## RECOMMENDED PRACTICE.

In 1911 a Recommended Practice was adopted that:

For fresh-meat cars, ice tanks of 5,000 pounds ice capacity be the minimum. For fruit and dairy cars, ice tanks of 3,000 pounds minimum, or 6,000 pounds per car.

## SPRINGS AND SPRING CAPS FOR FREIGHT-CAR TRUCKS.

## RECOMMENDED PRACTICE.

## Sheet M. C. B. — H.

In 1898 detail designs of spring coils and caps suitable therefor were adopted as Recommended Practice, and were then shown on Sheet M. C. B. — J.

In 1901 a committee presented revised drawings with full details and specifications. They were submitted to letter ballot and adopted as Recommended Practice, and are now shown on Sheet M. C. B. — H.

In 1901 designs with full details and specifications for springs for 100,000-pound capacity cars were presented, and as a result of letter ballot were adopted as Recommended Practice. See Sheet M. C. B. — H.

In 1912 the form of spring caps was changed. Revised 1913.

## FRAMING FOR BOX CARS.

## RECOMMENDED PRACTICE.

## Sheet M. C. B. — K.

In 1904, the style of framing shown on Sheet M. C. B. — K for cars of 60,000 pounds capacity was adopted as Recommended Practice.

In 1904, the style of framing shown on Sheet M. C. B. — K, for cars of 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904, the style of end framing shown on Sheet M. C. B.—K, for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904, the use of a plank lining  $1\frac{3}{4}$  inches thick, on the inside of the ends of cars, extending from the floor to the underside of the car line, was adopted as a Recommended Practice. See letter ballot, Proceedings 1904.

#### INSIDE DIMENSIONS OF BOX CARS.

#### RECOMMENDED PRACTICE.

In 1904, the inside dimensions of box cars approved by the American Railway Association, namely, 36 feet long, 8 feet 6 inches wide and 8 feet high, were adopted as a Recommended Practice.

#### HEIGHT AND WIDTH OF CARS.

#### RECOMMENDED PRACTICE.

In 1904 the following dimensions for box cars built on low trucks (3 feet 6 inches to top of floor) were adopted as Recommended Practice:

Height from top of rail to upper edge of eaves, 12 feet  $\frac{3}{4}$  inch;  
width at eaves at above height, maximum, 9 feet 7 inches.

### RULES FOR EXAMINATION OF CAR INSPECTORS—RECOMMENDED PRACTICE.

In 1902 the following rules for examination of car inspectors were adopted as a Recommended Practice of the Association:

#### REQUIREMENTS.

One year at oiling cars.

Two years at car repairing.

Age limit for new men, thirty years.

Age limit for promoted men, forty years.

Vision, 20-20 in one eye and not less than 20-40 in the other, without glasses.

**METHOD OF TESTING.—Acuity of Vision.**—The test card should be hung in a good light and the party to be examined should, if possible, be seated with his back to the window. Each eye should be examined separately, using, for the purpose of excluding one eye, a folded handkerchief. The lowest line that can be read should be determined by exposing only one letter at a time through a hole cut in a strip of cardboard. In making out the report in each case, the visual acuity of each eye should be denoted by a fraction of which the numerator represents the number of feet at which the applicant is seated from the card, while the denominator represents the number of feet at which the lowest line which he can read should be read. Thus, if at 20 feet he reads the line marked 20 feet, his vision—

20-20 or 1, which is the normal standard. If at the same distance he only can read the line marked 70 feet, his vision—20-70. If at 20 feet he reads the 15-foot line, the vision—20-15, or more than normal. If a room 20 feet long can not be used, a testing distance of 15 or 10 feet should be employed, in which case normal vision would be represented by 15-15 or 10-10 respectively, and lower grades of vision by such fractions as 15-20, 10-70 and so on.

*Field of Vision.*—Test should be made by having the applicant and examiner stand about three feet apart, each with one eye shut, looking each other steadily in the eye. The examiner should then bring his hand in from the edge of the field toward the center of the space between them, until the applicant sees it coming. This should be done from different directions, up, down and from each side. The applicant should see the hand coming about as soon as the examiner does. If not, this should be noted on the report.

*Hearing.*—Test should be made in a quiet room. First, the examiner should hold the watch opposite the ear to be examined not less than 48 inches distant, then gradually approach the ear until the applicant hears the tick, the stop being used to satisfy the examiner that the applicant is not deceiving. The distance at which the applicant hears the watch should be noted in inches. The normal ear should hear the tick of the watch at 48 inches. Then the hearing power will be denoted by a fraction whose numerator represents the number of inches at which the watch is heard. Thus, if he hears the watch at 48 inches, his hearing—48-48, or normal. If he hears it at only 10 inches distant, his hearing—10-48, and so on.

*Color.*—The committee does not think it essential that inspectors should be rejected on account of imperfect color sense. It is, however, believed that inspectors should be tested as to their color sense so that they, as well as their employer, may know their condition in this respect.

*Educational.*—The applicant should be able to write a legible hand in English, and also to read manuscript matter as well as printed matter.

*Car Knowledge.*—The inspectors should be able to name each part of the cars in general use, in preference using M. C. B. dictionary terms.

*M. C. B. Rules.*—Inspectors must pass a satisfactory examination on M. C. B. Rules, answering seventy-five per cent of the questions submitted. These questions should be of about the following character:

1. What are the Master Car Builders' Rules?
2. What is the object of the M. C. B. Rules?
3. What is the underlying idea or principle of these rules?
4. When is a company, operating the cars of another company, responsible for defects of such cars?
5. When a company is thus responsible, what should it do?
6. What care should be given to foreign cars by the company hauling them?
7. What cars must be accepted in interchange?
8. What is a defect card and how is it used?

9. Under what conditions is a road obliged to accept a car which is carded for defects for which the owner is not responsible?
10. What are the defects of wheels and axles for which owners and delivering companies are responsible?
11. Describe the form and use of the M. C. B. wheel gauge?
12. What are the rules which apply to the cleaning of triple valves and cylinders?
13. What does the limit of height of drawbars mean?
14. When a company is obliged to make improper repairs, what must it do to call attention to such repairs?
15. What does the term unfair usage mean?
16. What are the rules regarding splicing sills?
17. What is the purpose of the repair card?
18. How do these rules apply to switching roads?
19. Are switching roads allowed to render bills against owners direct for repairs of any other than those named in Section 23 of Rule 5?

### CLASSIFICATION OF CARS.

In 1910 a committee considered the question of harmonizing the terms used in designating the different kinds of cars in each class according to their physical requirements and submitting the following definitions, which were adopted by letter ballot as Recommended Practice.

In 1912 the designations RS, RA, RB, VS and VA were adopted.

In 1913 the following designations were adopted: BM, ES, GB, MBE, XI, MWX, MWE, MWJ, MWP, MWR, MWM, SH.

#### DEFINITIONS AND DESIGNATING LETTERS OF GENERAL SERVICE

##### PASSENGER EQUIPMENT CARS.

##### RECOMMENDED PRACTICE.

#### CLASS "B."

- "BA"—Baggage Car. A car run in passenger service, having wide side doors for the admittance of baggage, with or without windows or end doors.
- "BE"—Baggage Express. A car similar to baggage, used for either baggage or express matter.
- "BH"—Horse or Horse and Carriage Express. A car run in passenger service for the transporting of fine stock, fitted with stalls (movable or stationary) and space left for carriage or horse equipment.
- "BM"—Milk Car. Exclusively for the transportation of milk, being a car for this purpose and fully equipped for handling in passenger trains.

- "BR"**—Refrigerator Express. A car run exclusively in passenger service and fitted with ice bunkers or boxes, and suitable to carry produce, oysters, fish or any commodity requiring icing in transit.
- "BX"**—Express Car. Exclusively for express matter, having suitable side doors, with or without end doors or windows.

#### CLASS "C."

- "CA"**—Combined Car, Baggage and Passenger. A car having two compartments, one suitable for transporting baggage, the other fitted with seats for passengers, the two compartments separated by bulkheads.
- "CS"**—Combined Smoking and Baggage Car (Club Car). A car having two compartments, separated by bulkheads, one compartment suitable for transporting baggage, the other fitted with seats or chairs and used as smoking car; at times equipped with buffet or bar.
- "CO"**—Combined car having three separate compartments, separated by bulkheads, one compartment suitable for transporting baggage, one for mail fitted with suitable apparatus for sorting and classifying mail, and the other fitted with seats for the transportation of passengers.
- "CB"**—Business Car. A special type of car for the convenience of business men, used as smoker and fitted with tables or desks, carrying stationery and fitted with typewriters and carrying regular stenographers.

#### CLASS "D."

- "DA"**—Dining Car. Regular dining car, for the use of passengers in transit, fitted with regular kitchen, tables, chairs or seats, with or without bar, carrying cooks and waiters.
- "DB"**—Buffet Car. Car for the transportation of passengers and fitted with small broiler or buffet to serve simple meals to passengers; cooking and serving done on removable tables by regular porter in charge of car. With or without facilities for serving liquor.
- "DC"**—Café Car. A car fitted with kitchen, usually in center of car, one end used as café where meals are served, also liquor and smoking allowed, the other end of car fitted with either regular dining room or smoking and card room; carrying cooks and waiters.
- "DG"**—Grill Room Car. Very similar to café car.
- "DO"**—Café Observation Car. Car fitted with café at one end, kitchen in center or extreme end, having observation compartment fitted with stationary or movable tables and observation platform at rear.
- "DP"**—Dining and Parlor Car. A car fitted with dining compartment, kitchen and compartment for passengers, fitted with chairs, stationary or otherwise, carrying regular cooks and waiters.

## CLASS "E."

- "EA"—Electric Street Railway Service Car, direct current, for transportation of passengers; without automatic couplings.
- "EP"—Electric Passenger Car, for long hauls or suburban service, multiple unit and fitted with automatic couplings and air brakes. Third rail, trolley or pantagraph contact.
- "EB"—Electric Baggage Car, for long hauls or suburban service, multiple unit with automatic couplings and air brakes and suitable for the transportation of baggage. Third rail, trolley or pantagraph contact.
- "EM"—Electric Mail Car, for use in United States Mail Service, fitted with side doors, with or without mail hook, and suitable apparatus for the sorting and classifying of mail en route. With or without end doors or windows.
- "EC"—Electric Combined. A car for long hauls or suburban service, multiple unit with automatic couplings and air brakes. This car is made up of two compartments, separated by bulkhead, one suitable for the transportation of baggage and the other fitted with seats or chairs for the use of passengers. Third rail, trolley or pantagraph contact.
- "EG"—Gasoline Motor Propelled Car, for inspection or private use, or use in suburban service, hauling one or more trailers.
- "ED"—Gasoline Motor Car. Gasoline engine or engine serving to run dynamo to furnish electricity for axle motors. Car to be used for inspection, private use, or as motive power to haul trailer or trailers; fitted with storage cells and with or without booster.
- "ES"—Electric Passenger Car. For long hauls or suburban service; multiple unit, and fitted with automatic couplings and air brakes. Operating power, storage battery.

## CLASS "M."

- "MA"—Postal Car. For use of United States Mail Service, fitted with side doors, with or without mail-bag hook, and having suitable apparatus for the sorting and classifying of mail in transit, with or without end doors or windows.
- "MB"—Baggage and Mail. A car having two compartments, one for baggage and one for mail, separated by bulkheads; the mail end fitted with suitable apparatus for sorting and classifying mail, and with or without mail-bag catchers, with or without end doors or windows, and having suitable side doors.
- "MP"—Postal Car. Suitable for transporting newspapers or large mail packages for United States Mail Service, having side doors and fitted with stanchions, with or without end doors or windows.
- "MR"—Postal Storage Cars. For United States Mail Service, suitable to carry mail in bulk, without appliances for sorting or classifying,

fitted with side doors and stanchions and with or without end doors or windows.

- "MS"—Mail and Smoker. A combined car having two separate compartments, separated by bulkheads, one compartment suitable for the transportation, sorting and classifying of mail, the other fitted with seats or chairs to be used by passengers as smoking car.
- "MBE"—Combination Baggage, Mail and Express Car. A car having three compartments, each entirely separate from the other for handling its individual class of business.

#### CLASS "P."

- "PA"—Passenger Car. A car for ordinary short haul suburban service, with seats and open platforms.
- "PB"—Passenger Car. A vestibule (wide or narrow) car for through service, fitted with seats or reclining seats, and having toilet rooms for men and women, also wash basins.
- "PE"—Emigrant or Colonist Car. A second-class passenger car, with floors either bare or fitted with matting, used expressly for emigrant trade on trains where low rate of fare is charged.
- "PS"—Sleeping Car. A car for passenger service having seats that can be made up into berths, and usually having one or more separate state-room compartments, also toilet and washroom facilities for men and women, and smoking compartment for men. Some cars of this class are all compartments, and some compartment and observation combined.
- "PN"—Passenger car used exclusively as smoking car, with seats or chairs and fitted with cuspidors or having matting or bare floor.
- "PO"—Observation Car. A car having observation compartment at one end and fitted with either berth facilities, parlor chairs or compartments, usually run in first-class service.
- "PV"—Private cars used as officers' or private individual's car and railroad pay car—usually composed of sleeping compartments, dining compartments, observation end and with kitchen, servant's quarters and toilet and bathroom.
- "PT"—Tourist Car. A second-class sleeping-car, fitted usually with cane seats convertible into berths and used mostly on trans-continental trains; cars fitted with smoking compartment, toilet and washroom.
- "PC"—Passenger, Parlor or Chair Car. A car fitted with individual stationary or movable chairs, used on trains for daylight runs and having toilet and washrooms.

## CLASS "I."

"IA"—Instruction Cars for use of employees, usually run from one point to another in passenger trains.

NOTE.—If it is so desired, a small letter "E" can be placed after the larger designating letters to indicate electric lighting, and small "G" for gas lighting, also figures showing approximate length of car or length of baggage or mail compartment.

## GENERAL SERVICE FREIGHT EQUIPMENT CARS.

## CLASS "X."

"XM"—Box Car. General service, suitable to lading which should be kept from the weather. A box car is a closed car having side and end housings and roof, with doors in sides or sides and ends.

"XA"—Automobile Car. Box car of similar design to general service car, having exceptionally large side doors or end doors.

"XF"—Furniture Car. Box car of similar design to general service car, except usually greater capacity in cubic feet.

"XV"—Box Car, Ventilated. Similar to ordinary box, only having ventilation, and suitable for the transportation of produce or other food-stuffs not needing refrigeration.

"XI"—Box Car, Insulated. A box car having walls, floor and roof insulated, not equipped with ice bunkers or baskets. This car ordinarily used for transporting vegetables, freight, etc.

## CLASS "R."

"RA"—Meat and Provision Refrigerator. A car equipped with insulation and brine ice tanks without ventilating devices.

"RB"—Beer and Ice Refrigerator. A car with body and doors equipped with insulation, having no ice tanks or ventilating devices.

"RM"—Refrigerator or Produce Car. A car suitable for carrying commodities that need icing in transit. This car is equipped with two or more ice bunkers or baskets and suitable means for draining off melted ice or briny water. This car has side and end housings, roof and side doors, usually insulated, with trap doors in roof for admittance of ice and salt; also water seals inside of car.

"RS"—Standard Refrigerator. A car equipped with insulation, ice tanks and ventilating devices.

## CLASS "V."

"VA"—Vegetable Ventilator. A car equipped with insulation, but having common box car end and side doors which afford no protection against heat or cold.

"VS"—Standard Ventilator. A car equipped with insulation, including insulated side, end and top openings, and ventilating devices without ice tanks.

#### CLASS "S."

"SM"—Stock Car. This car is for transportation of stock on the hoof, and is equipped with roof, slatted sides and side doors, and single or double deck. With or without feed or feed and water troughs.

"SD"—Stock Car. Composite having drop doors in floor and means of housing in sides and making drop-bottom box car.

"SP"—Stock Car. Used in poultry trade, fitted with roof and sides usually of wire netting, fitted with shelves for storing crates of poultry and leaving space for poultrymen, feed bag and watering facilities.

#### CLASS "G."

"GA"—Gondola Car. This car has sides and ends; open at top, and drop bottom; suitable for general coal or ore trade, stone or general trade.

"GE"—Gondola car having drop bottoms and drop ends; suitable for general coal or ore or mill trade.

"GC"—Gondola Coke Car. Gondola car fitted with coke racks and having drop bottoms.

"GD"—Gondola car having side-dump arrangement.

"GM"—Gondola Car. Suited to mill trade, having solid bottom, low sides and drop ends to facilitate twin shipments.

"GB"—Gondola Car. A car with solid bottom, sides and ends, and open on top; suitable for mill trade.

#### CLASS "H."

"HM"—Hopper Car. Similar in general design to gondola car, having sides and bottom ends and open at top, equipped with hopper bottom and self-cleaning.

"HT"—Hopper (Twin). Similar to ordinary hopper, only equipped with two or more hopper doors instead of one.

"HD"—Hopper car equipped with side-dump hoppers.

"HC"—Hopper car equipped with coke racks.

NOTE.—If any of these hopper cars are provided with roof or cover for protection of contents, the letter "R" should be affixed to the regular symbol to designate its special class of service.

#### CLASS "F."

"FM"—Ordinary flat car for general service. This car has flooring laid over sills and without sides or ends.

"FG"—Flat or gun truck car for special transportation of heavy ordnance.

"FW"—Flat well-hole car for special transportation of plate glass, etc. This car is a flat car with hole in middle to enable lading to be dropped down on account of clearance limits.

- "FB"—Flat car having skeleton superstructure, suitable for carrying barrels, known as "Barrel Rack Car."
- "FL"—Flat logging car or logging truck. This is either an ordinary flat car, or car consisting of two trucks fitted with cross supports over truck bolsters; the trucks connected by a skeleton of flexible frame and logs loaded lengthwise on cross supports.

#### CLASS "T."

- "TM"—Tank car for general service. This car is for general oil or liquid service, and consists of a steel tank mounted on frame or mounted directly on cradles over truck bolsters. It is equipped with one or two safety release valves, and is emptied by valves or valve at bottom. At the top is a dome, with or without manhole, and openings through which the tank may be filled.
- "TA"—Acid Tank. Of same general construction as oil tanks.
- "TG"—Tank car having glass or glass-lined tanks, for use in hauling mineral waters and other special products.
- "TS"—Tanks for special commercial service.
- "TW"—Tank car having wooden tank, instead of steel, and used for water, pickles, etc.

#### CLASS "N."

- "NM"—Freight train service caboose for convenience of trainmen. This caboose is mounted on four wheels and has lookout at top over roof. It is fitted with bunks or benches and a stove for cooking and heating purposes, also tank for storage of drinking and washing water, and small tool storage boxes.
- "NE"—Caboose mounted on eight wheels and longer than four-wheel caboose, but of the same general design.

#### CLASS "Y."

- "YM"—Yard Poling Car. This car used in hump classification and flat-yard classification. This car is usually fitted with small house or protection and benches, tool box and stove, a counterweighted pole on each side and running board or step near the ground for convenience of yardmen. It is protected with safety appliances and, when in use, coupled to an engine.
- "YA"—Yard pick-up car for use of car droppers and yardmen in performance of their duty. It might be termed a "Car Dropper's Car." It is protected by house, around which runs a platform and railing, a long running board on sides near ground and is fitted with benches, tool box and stove.

NOTE.—The capacity of car can be shown by affixing two figures after designating letter: for instance, "80" would mean 80,000 pounds capacity;

"10" would mean 100,000 pounds capacity; "60" would mean 60,000 pounds capacity. Where tanks are in question the capacity numbers should indicate capacity in gallons instead of pounds.

### GENERAL SERVICE MAINTENANCE OF WAY EQUIPMENT CARS.

Any of the following classes of equipment, having special heating appliances for the protection of commodities against freezing, to be covered by affixing the letter "H" to the designating symbol.

"SH"—Horse Car. A car specially fitted for the transportation of horses in freight service.

Weed Burner.—A car equipped with machinery for propelling itself, or otherwise, and burning weeds along the track as it proceeds.

Ditching Car.—A car equipped with machinery for propelling itself, or otherwise, and excavating ditches along the sides of the track as it proceeds.

Rail Saw.—A car equipped with machinery for sawing track rails and similar material.

Rail Bender.—A car equipped with machinery for bending track rails and similar material.

Grass Cutter.—A car equipped with machinery for propelling itself, or otherwise, and cutting grass along the track as it proceeds.

Track Layer.—A car equipped with machinery for propelling itself, or otherwise, and laying the track ahead of it as it proceeds.

"MWB"—Ballast Cars. All descriptions of cars used for the purpose of carrying ballast for the laying of new right of way and repairs. The car used generally for this work is of the gondola type, with side or center dump.

"MWD"—Dump Cars. On the type of contractors' car used for building up fills; the body of the car dumps, being raised by means of counterweight, air or hand power.

"MWF"—Flat Car. Used for transporting rails, ties or ballast and for storage of wrecking trucks, or gathering scraps along right of way. These cars are at times equipped with low sides, about 10 or 12 inches high.

"MWS"—Steam Shovel. Car equipped with donkey engine housed in. Having a boom of wood or steel and the end of which is a shovel or scoop. It may be propelled by its own power or by means of a locomotive and run as a car in freight trains, being equipped with safety appliances. The cubic capacity of shovels, in yards, can be indicated by figures after classification letters.

"MWW"—Wrecking Derrick. A derrick used for wrecking purposes, having donkey engine to raise and lower booms and hoists; engine

housed in and on separate platform with boom, is pivoted in center of car frame in order that it can be worked on either sides or ends; usually fitted with anchor beams to be used for heavy lifting. Fitted with safety appliances and propelled by means of locomotive. Lifting capacity in tons shown by means of figures.

- "MWU"—Wrecking Derrick. This derrick has boom and hoist fitted to frame of flat car and lifting done by means of hand power; propelled by locomotive.
- "MWV"—Wrecking Derrick. This derrick has boom and hoist fitted to flat car and having drum at one end to furnish means of hoisting; steam furnished to donkey engine, running drum, by means of flexible steam line from attached locomotive; propelled by locomotive.
- "MWT"—Tool and Block Car. A car used for carrying all descriptions of tool equipment and blocking. This car has side and end housings and roof, also end platforms. There are doors in sides and ends and usually windows. It is fitted inside with proper racks and boxes for storage of tools.
- "MWC"—Caboose and Tool Car. Similar to tool car, but having one end fitted up as a caboose, with bunks, stove and water storage, with or without lookout, and is used in either work or wrecking trains.
- "MWH"—Hand Car. This car is flat and mounted on four wheels and propelled by means of pushing; known as "Push Car."
- "MWL"—Hand Car. This is a small flat car, with or without seats, mounted on four wheels and propelled by means of cranks or hand levers.
- "MWG"—Section Gang or Track Inspection Car. Flat car, with or without seats or tool boxes, and equipped with single or double cylinder gasoline engine serving as motive power.
- "MWX"—Boarding Outfit Car. This includes cars used for boarding, sleeping or cooking purposes in construction and similar work.
- "MWE"—Ballast Spreader and Trimmer. A car with blades or wings for spreading or trimming ballast.
- "MWJ"—Ballast Unloader. A car equipped with machinery for pulling a plow through cars loaded with ballast.
- "MWP"—Pile Driver. A car equipped with machinery for pile driving.
- "MWK"—Snow-removing Car. A car equipped with any special device for removing snow from between or alongside of rails.
- "MWM"—Store-supply Car. A car equipped for handling material to be distributed for railway use.

## LUMBER SPECIFICATIONS.

### RECOMMENDED PRACTICE.

In 1910 a joint committee of the American Railway Master Mechanics Association and this Association working in conjunction with the Railway Storekeepers' Association and the various Lumber Manufacturers' Associations, submitted specifications and grading rules for car and locomotive lumber, which, on motion, were ordered submitted to letter ballot and adopted as Recommended Practice. They are as follows:

In order to have standard descriptions of the various woods used by railroads, the following standard names for car and locomotive lumber were agreed upon by the Joint Committee:

## LUMBER SPECIFICATIONS.

Description of various woods used by railroad companies for car and locomotive lumber.

1. *Ash* .....To cover White, Black, Blue, Green and Red Ash.
2. *Basswood* .....To cover Linden, Linn, Lind or Lime-tree.
3. *Beech* .....To cover Red and White Beech.
4. *Birch* .....To cover Red, White, Yellow and Black Birch.
5. *Buckeye*. ....To cover wood from Horse-chestnut tree.
6. *Butternut* .....To cover wood from tree of that name, also known as White Walnut.
7. *Cherry* .....To cover Sweet, Sour, Red, Black and Wild Cherry.
8. *Chestnut* .....To cover wood from tree of that name.
9. *Cottonwood* .....To cover wood from tree of that name. (Do not confuse with Popple or Poplar.)
10. *Cypress* .....To cover Red, Gulf, Yellow and East Coast Cypress, also known as Bald Cypress.
11. *Elm — soft* .....To cover White, Water, Gray, Red or Slippery and Winged Elm.
12. *Elm — rock* .....To cover Rock or Cork Elm.
13. *Douglas Fir* .....To cover Yellow, Red, Western, Washington, Oregon, Puget Sound Fir or Pine, Norwest and West Coast Fir.
14. *Gum* .....To cover Red Gum, Sweet Gum or Satin Walnut.
15. *Hemlock* .....To cover Southern and Eastern Hemlock; that is, Hemlock from all States east of and including Minnesota.
16. *Western Hemlock* ....To cover Hemlock from the Pacific Coast.
17. *Hickory* .....To cover Shellbark, Kingnut, Mockernut, Pignut, Black, Shagbark and Bitternut.

18. *Western Larch* .....To cover the species of Larch or Tamarack from the Rocky Mountain and Pacific Coast regions.
19. *Maple—soft* .....To cover Soft and White Maple.
20. *Maple—hard* .....To cover Hard, Red, Rock and Sugar Maple.
21. *White Oak* .....To cover White, Burr or Mossy Cup, Rock, Post or Iron, Overcup, Swamp Post, Live, Chestnut or Tan Bark, Yellow or Chinquapin and Basket or Cow Oak.
22. *Red Oak* .....To cover Red, Pin, Black, Water, Willow, Spanish, Scarlet, Turkey, Black Jack or Barn and Shingle or Laurel Oak.
23. *Pecan* .....To cover wood from tree of that name.
24. *Southern Yellow Pine*.To cover Long-leaf and Short-leaf Yellow Pine grown in the Southern States.
25. *White Pine* .....To cover wood from tree of that name grown in Maine, Michigan, Wisconsin, Minnesota and Canada.
26. *Norway Pine* .....To cover Norway or Red Pine grown in Michigan, Minnesota, Wisconsin and Canada.
27. *Idaho White Pine* ....To cover variety of White Pine grown in western Montana, northern Idaho and eastern Washington.
28. *Western Pine* .....To cover timber known as White Pine grown in Arizona, California, New Mexico, Colorado, Oregon and Washington; sometimes known as Western Yellow or Ponderosa Pine, or California White Pine or Western White Pine.
29. *Poplar* .....To cover wood from the Tulip Tree, otherwise known as Whitewood, Yellow Poplar and Canary Wood.
30. *Redwood* .....To cover wood from tree of that name.
31. *Spruce* .....To cover Eastern Spruce; that is, the Spruce timber coming from points east of and including Minnesota and Canada, covering White, Red and Black Spruce.
32. *Western Spruce* .....To cover the Spruce timber from the Pacific Coast.
33. *Sycamore* .....To cover wood from tree of that name, otherwise known as Buttonwood.
34. *Tamarack* .....To cover Tamarack or Eastern Tamarack, grown in States east of and including Minnesota.
35. *Tupelo* .....To cover Tupelo Gum and Bay Poplar.
36. *Walnut* .....To cover Black Walnut (for White Walnut, see Butternut).

CLASSIFICATION, GRADING AND DRESSING RULES FOR  
NORTHERN PINE CAR MATERIAL, INCLUDING  
WHITE AND NORWAY PINE AND  
EASTERN SPRUCE.

1. *Norway Pine.* To cover Norway or Red Pine grown in Michigan, Minnesota, Wisconsin and Canada.

*White Pine* to cover wood from tree of that name grown in Maine, Michigan, Wisconsin, Minnesota and Canada.

*Spruce* to cover Eastern Spruce; that is, the Spruce timber coming from points east of and including Minnesota and Canada, covering White, Red and Black Spruce.

2. *Northern Pine Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Northern Pine are knots, knotholes, splits, shake, wane, wormholes, pitch pockets, torn grain, loosened grain, sap, sap stain, checks and rot.

**KNOTS.**

4. Knots shall be classified as pin, small and large or coarse, as to size, and round or spike, as to form, and as sound, loose, encased, pith and rotten, as to quality.

5. A pin knot is sound and shall not exceed  $\frac{1}{2}$  inch in diameter.

6. A small knot is larger than a pin knot and shall not exceed  $1\frac{1}{2}$  inches in diameter.

7. A large or coarse knot is one of any size over  $1\frac{1}{2}$  inches in diameter.

8. A sound knot is oval or circular in form.

9. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

10. A sound knot is one solid across its face; is as hard as the wood it is in and is so fixed by growth or position that it will retain its place in the piece.

11. A loose knot is not firmly set, but still retains its place in the piece.

12. A pith knot is a sound knot with a pith hole not more than  $\frac{1}{4}$  inch in diameter.

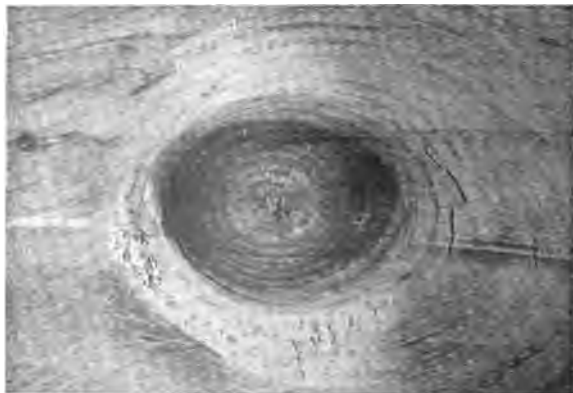
13. An encased knot is one surrounded wholly by bark or pitch.

14. A rotten knot is one not as hard as the wood it is in.

**EXHIBIT A — NORTHERN WHITE PINE.**



**FIG. 1.— PIN KNOTS.**



**FIG. 2.— SMALL AND ROUND KNOT.**

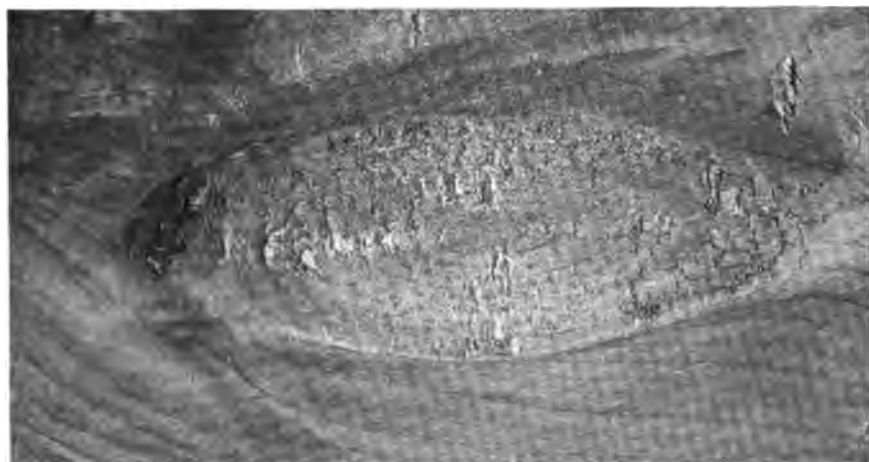


FIG. 3.— LARGE KNOT.



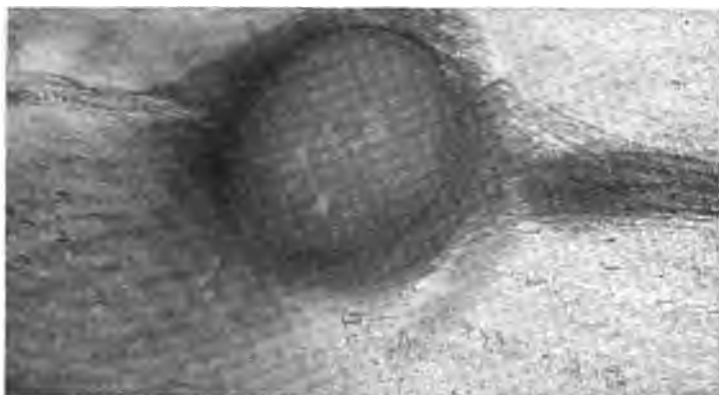
FIG. 4.— SPIKE KNOT.



FIG. 5.— SOUND KNOTS.



FIG. 6.— LOOSE KNOT.



**FIG. 7.—ENCASED KNOT.**



**FIG. 8.—SMALL PITCH POCKET.**

## PITCH.

15. Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

16. A small pitch pocket is one not over  $\frac{1}{8}$  of an inch wide.

17. A standard pitch pocket is one not over  $\frac{3}{8}$  of an inch wide, or 3 inches in length.

18. A large pitch pocket is one over  $\frac{3}{8}$  of an inch wide or over 3 inches in length.

19. A pitch pocket showing open on both sides of the piece  $\frac{1}{8}$  of an inch or more in width shall be considered the same as a knothole.

## WANE.

20. Wane is bark, or the lack of wood, from any cause, on edge.

## SAP.

21. White or bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

## MISCELLANEOUS.

22. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

23. All lumber for uses described in these rules shall be inspected on the face side to determine the grade, and the face side is the side showing the best quality or appearance.

24. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found should not be classed as torn grain, and shall not be considered a defect.

25. Torn grain consists in a part of the wood being torn out in the dressing. It occurs around knots and curly places, and is of four distinct characters; slight, medium, heavy and deep.

Slight torn grain shall not exceed 1-32 of an inch in depth, medium 1-16 of an inch, and heavy  $\frac{1}{8}$  of an inch. Any torn grain heavier than  $\frac{1}{8}$  of an inch shall be termed deep.

26. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the coarsest pieces *such grades may contain*, but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

27. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

28. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

29. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or mill work will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

30. The foregoing general observations shall apply to and govern the application of the following rules. The rules referred to under Sections 31, 32, 33, 34 and 35 govern 4 or 6 inch strips, and are intended to cover strips used for car siding, car lining and car roofing.

*B and Better White Pine.*

31. Material of this grade shall be practically clear and free of all defects, except will admit of not exceeding four pin knots, and bright sap not to exceed 25 per cent of the face of the piece.

*C and Better Norway Pine.*

32. Bright sap is no defect in this grade and stained sap will be admitted to the extent of not exceeding 1-5 the surface of the face of the piece, if not in combination with other defects. This grade shall be free from shake, rot and splits, but will admit of not exceeding four pin knots.

*No. 1 Common White Pine, Norway Pine and Eastern Spruce.*

33. This grade admits of small sound knots, but shall be free from large or coarse knots, knotholes, should have practically no shake, wane or rot, but will admit of bright sap to any extent.

*No. 2 Common White Pine, Norway Pine and Eastern Spruce.*

34. This grade is similar to No. 1, described above, except that it will admit of spike knots, bright or stained sap, slight shake, slight wane on reverse side, but not a serious combination of any of these defects.

*No. 3 Common White Pine, Norway Pine and Eastern Spruce.*

35. This grade, in addition to the defects mentioned in No. 2, described above, will also admit of large or coarse knots, more shake, sap, wane on reverse side that does not affect the tongue or groove and torn or loosened grain, checks, pin wormholes and splits, but no loose knots or knotholes, nor a serious combination of the defects named.

*No. 1 Common Norway Pine Car Decking or Flooring.*

36. This grade will admit of sound knots, any amount of sap, and shall be free from shake, wane, rot and large or coarse spike knots.

37. STANDARD LENGTHS.

CAR SIDING—8, 9, 10 and 12 feet or multiples.

CAR ROOFING—5 feet or multiples.

CAR LINING—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

CAR DECKING—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

## CLASSIFICATION, GRADING AND DRESSING RULES FOR SOUTHERN YELLOW PINE CAR MATERIAL.

1. *Southern Yellow Pine*.—To cover Long-leaf and Short-leaf Yellow Pine grown in the Southern States.

2. *Southern Yellow Pine Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller*.

3. Recognized defects in Southern Yellow Pine are knots, knotholes, splits (either from seasoning, ring hearts or rough handling), shake, wane, red heart, pith, rot, rotten streaks, dote, red heart, wormholes, pitch streaks, pitch pockets, torn grain, loosened grain, seasoning or kiln checks and sap, sap stains and imperfect manufacture.

### KNOTS.

4. Knots shall be classified as pin, standard and large, as to size; and round and spike, as to form; and as sound, loose, encased, pith and rotten, as to quality.

5. A pin knot is sound and not over  $\frac{1}{2}$  inch in diameter.

6. A standard knot is sound and not over  $1\frac{1}{2}$  inches in diameter.

7. A large knot is one any size over  $1\frac{1}{2}$  inches in diameter.

8. A round knot is oval or circular in form.

9. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

10. A sound knot is one solid across its face; is as hard as the wood it is in and is so fixed by growth or position that it will retain its place in the piece.

11. A loose knot is one not held firmly in place by growth or position.

12. A pith knot is a sound knot with a pithhole not more than  $\frac{1}{4}$  inch in diameter.

13. An encased knot is one surrounded wholly or in part by bark or pitch. Where the encasement is less than  $\frac{1}{8}$  of an inch in width on both sides, not exceeding one-half the circumference of the knot, it shall be considered a sound knot. (See Sections 10 and 17.)

14. A rotten knot is one not as hard as the wood it is in.

EXHIBIT B — SOUTHERN YELLOW PINE.



FIG. 1.— LOOSE KNOT.

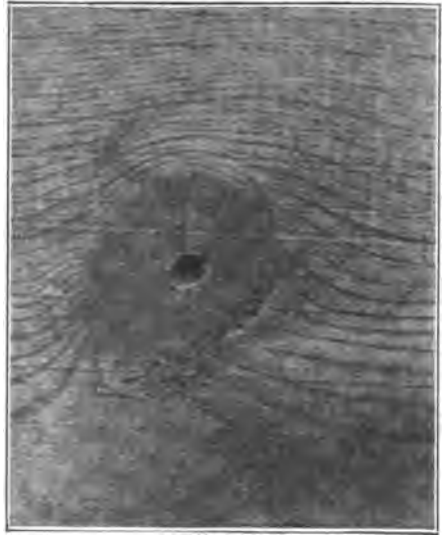


FIG. 2.— PITH KNOT.



FIG. 3.— ENCASED KNOT.



FIG. 4.— ROTTEN KNOT.

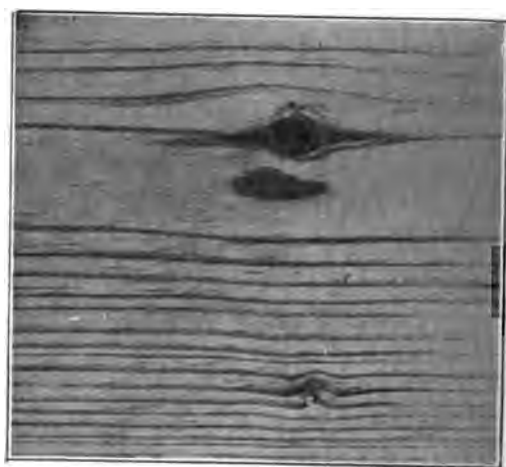


FIG. 5.— PIN KNOT.

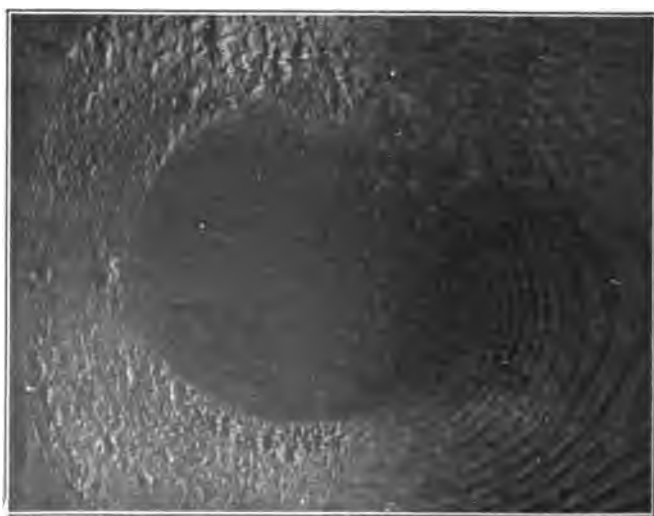


FIG. 6.— STANDARD KNOT.

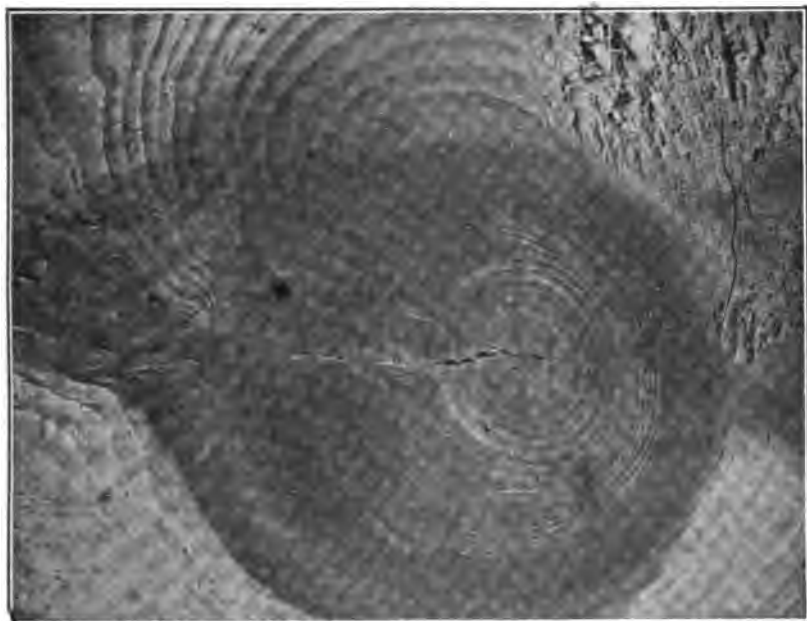


FIG. 7.— LARGE KNOT.



FIG. 8.— SPIKE KNOT.

**PITCH.**

15. Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

16. A small pitch pocket is one not over  $\frac{1}{8}$  of an inch wide.

A standard pitch pocket is one not over  $\frac{3}{8}$  of an inch wide or 3 inches in length.

A large pitch pocket is one over  $\frac{3}{8}$  of an inch wide or over 3 inches in length.

17. A pitch pocket showing open on both sides of the piece  $\frac{1}{8}$  of an inch or more in width shall be considered the same as a knothole.

18. A pitch streak is a well-defined accumulation of pitch at one point in the piece, and when not sufficient to develop a well-defined streak, or where fibre between grains is not saturated with pitch, it shall not be considered a defect.

19. A small pitch streak shall be equivalent to not over one-twelfth the width and one-sixth the length of the piece it is in.

A standard pitch streak shall be equivalent to not over one-sixth the width and one-third of the length of the piece it is in.

(See Exhibit C.)

EXHIBIT C.



FIG. 9.— PITCH POCKET.

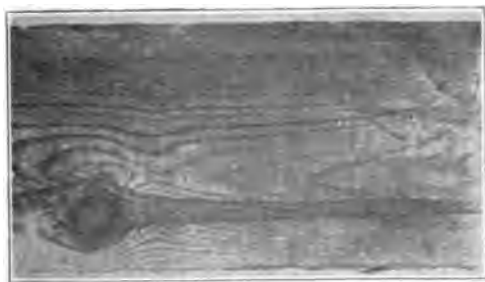


FIG. 10.— PITCH STREAK.

**WANE.**

20. Wane is bark, or the lack of wood, from any cause, on the edge.

**SAP.**

21. Bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

**SHAKE.**

22. Shakes are splits or checks in timbers which usually cause a separation of the wood between annual rings.

*Through Shake:* A shake which extends between two faces of a timber.

*Ring Shake:* An opening between the annual rings.

**MISCELLANEOUS.**

23. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

24. All stock except car sills and framing shall be inspected on the face side to determine the grade. Stock surfaced one side, the dressed surface shall be considered the face side. Stock rough or dressed two sides, the best side shall be considered the face, but the reverse side of all such stock shall not be more than one grade lower.

25. Pieces of siding, lining or roofing with 3-16 of an inch or more of tongue will be admitted in any grade, provided it does not run more than one-third the length of the piece.

26. In all grades lower than B and better, wane on the reverse side, not exceeding one-third the width and one-sixth the length of any piece is admissible; provided the wane does not extend into the tongue, or over one-half the thickness below the groove.

27. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found shall not be classed as torn grain and shall not be considered a defect.

28. Torn grain consists in a part of the wood being torn out in dressing. It occurs around knots and curly places, and is of four distinct characters — slight, medium, heavy and deep.

Slightly torn grain shall not exceed 1-32 of an inch in depth; medium, 1-16 of an inch; heavy,  $\frac{1}{8}$  of an inch; any torn grain heavier than  $\frac{1}{8}$  of an inch shall be termed deep.

29. Loosened grain consists in a point of one grain being torn loose from the next grain. It occurs on the heart side of the piece and is a serious defect, especially in flooring.

30. *Rot, Dote and Red Heart:* Any form of decay which may be evident either as a dark-red discoloration not found in the sound wood, or the presence of white or red rotten spots, shall be considered as a defect.

Firm red heart shall not be considered a defect in any of the grades of Common Lumber.

31. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* pieces *such grades may contain*, but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

32. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

33. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

34. Equivalent means equal, and in construing and applying these rules, the defects, whether specified or not, are understood to be equivalent in damaging effect to those mentioned applying to stock under consideration.

35. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

36. The foregoing general observations shall apply to and govern the application of the following rules:

37. *B and Better Car Siding, Lining and Roofing* will admit any two of the following, or their equivalent of combined defects: Sap stain not to exceed five per cent; firm red heart not to exceed fifteen per cent of the face; three pin knots; one standard knot; three small pitch pockets; one standard pitch pocket; one standard pitch streak; slight torn grain, or small kiln or season checks. Where no other defects are contained, six small pin wormholes will be admitted.

38. *Select Car Siding* will admit of one standard pitch streak, one standard pitch pocket, or their equivalent; and, in addition, will admit of not exceeding five pin knots and two standard knots, or their equivalent; ten per cent sap stain; firm red heart; slight shake; heavy torn grain; defects in manufacture or seasoning checks. Pieces otherwise good enough for B, but containing a limited number of pin wormholes shall be graded *select*. This grade is intended to be accumulated from running B and Better stock, and will consist of all the droppings which do not contain defects in excess of those mentioned in this paragraph.

39. *No. 1 Common Car Siding* will admit of the following defects or their equivalent: Sound knots, not over one-half of cross section of the piece at any point throughout its width; three pin knots or their equivalent; wane  $\frac{1}{2}$  inch deep on edge not exceeding  $1\frac{1}{2}$  inches wide and one-half the length of the piece; torn grain; pitch pockets; pitch; sap stain; seasoning checks; slight shakes; firm red heart and a limited number of small wormholes well scattered. This grade is intended to be worked from fencing stock, either kiln or air dried.

40. *Select Car Lining and Roofing* will admit of one standard pitch streak; one standard pitch pocket, or their equivalent, and, in addition, sound knots not over one-half the width of the piece in the rough; ten per cent sap stain; firm red heart; slight shakes; heavy torn grain; defects in manufacture, or seasoning checks. Pieces otherwise good enough for B, but containing a limited number of pin wormholes shall be graded *select*. This grade is intended to be accumulated from running B and Better stock, and will consist of all the droppings which do not contain defects in excess of those mentioned in this paragraph.

41. *No. 1 Common Car Lining and Roofing* will admit of the following defects or their equivalent: Sound knots not over one-half the cross section of the piece at any point throughout its length; three pin knots or their equivalent; torn grain; pitch pockets; sap stains; seasoning checks; firm red heart, and a limited number of pin or small wormholes well scattered. This grade is intended to be worked from fencing stock, either kiln or air dried.

42. *Standard Patterns*. (Insert B/P reference, showing net sizes after working.)

43. *All-heart Car Decking or Flooring* will admit sound knots not over one-third of the cross section of the piece at any point throughout its length, provided they are not in groups; pitch pockets; firm red heart; shake and seasoning checks which do not go through the piece; loose or heavy torn grain, or other machine defects, which will lay without waste or will not cause a leakage in cars when loaded with grain. Must be strictly *all heart* on both sides and both edges.

44. *Heart Face Car Decking or Flooring* will admit of sound knots not over one-third the cross section of the piece at any point throughout its length; provided they are not in groups; pitch pockets; firm red heart; shake and seasoning checks which do not go through the piece; loosened or heavy torn grain, or other machine defects, which will lay without waste, or will not cause a leakage in cars when loaded with grain. Will admit of any amount of *sap* provided all of the face side of the piece is strictly *all heart*.

45. *No. 1 Common Car Decking or Flooring* will admit of sound knots not over one-half the cross section of the piece at any point throughout its length, provided they are not in groups; pitch pockets; sap stain; firm red heart; shake and seasoning checks which do not go through the piece; a limited number of pin wormholes; loosened or heavy torn grain, or other machine defects, which lay without waste, or will not cause a leakage in cars when loaded with grain.

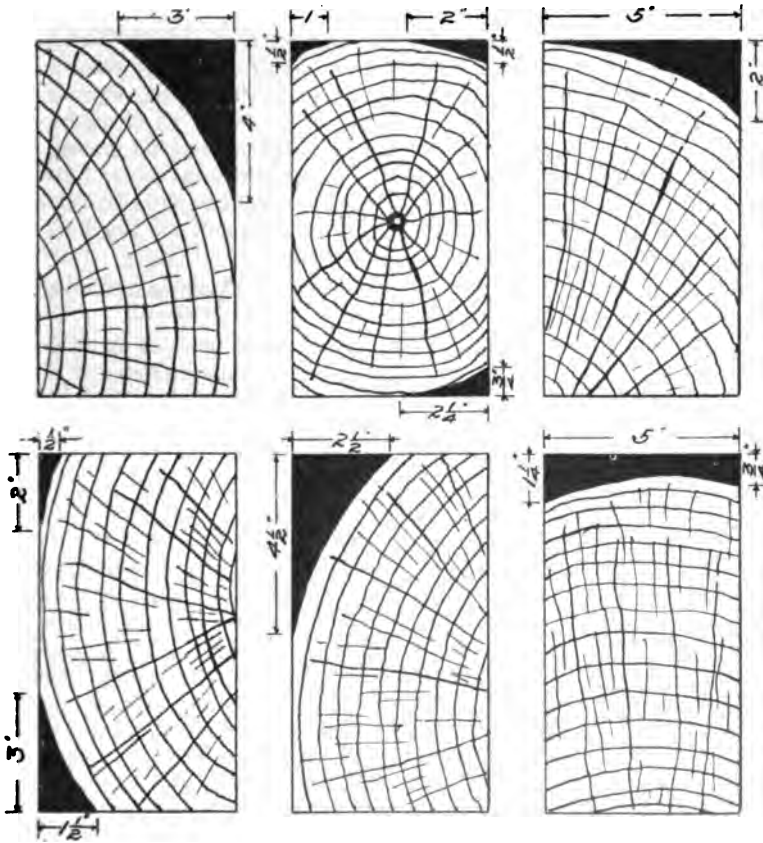
46. STANDARD LENGTHS:

CAR SIDING—8, 9, 10 and 12 feet or multiples.

CAR LINING—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

CAR ROOFING—5 feet or multiples.

CAR DECKING OR FLOORING—9 and 10 feet or multiples.



**LUMBER SECTIONS.**

SHOWING 75 % HEART.

ALL SECTIONS 5x9" TOTAL SURFACE 28"

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped, except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

#### CAR SILLS AND FRAMING.

47. *No. 1 Common Heart Car Sills and Framing* will admit of sound knots, provided they are not in groups, the mean or average diameter of which shall not exceed two (2) inches; pitch; pitch pockets; slight shake; seasoning checks, or other defects which will not impair its strength more than the defects aforementioned. Must be sawed from sound timber, free from doty or rotten red heart and true to measurements, or at least the measurements at no point on the sill shall be less than the size required.

Measurement of the girth at any point throughout the length of the piece must show at least 75 per cent heartwood.

Cubical contents shall not be used as basis for obtaining percentage of heartwood under this rule.

48. *No. 1 Common Car Sills and Framing* will admit of sound knots, provided they are not in groups, the mean or average diameter of which shall not exceed two (2) inches; pitch; pitch pockets; slight shake; seasoning checks; sap; sap stain, or other defects which will not impair its strength more than the defects aforementioned. Must be sawed true to measurements and from sound timber free from doty or rotten red heart; must be square cornered, except that one (1) inch of wane on one corner or one-half ( $\frac{1}{2}$ ) inch of wane on two corners is admissible.

49. *Sizes* up to 6 inches in width shall measure full when green, and not more than  $\frac{1}{8}$  inch scant when dry or part dry. Sizes 6 to 12 inches in width shall measure full when green and not more than  $\frac{1}{4}$  inch scant when dry or part dry. Sizes 12 to 16 inches in width shall measure full when green and not more than  $\frac{3}{8}$  inch scant when dry or part dry. Unless otherwise specified, one-fourth inch shall be allowed for each side which is to be dressed. In pieces 3 by 6 inches and under when ordered in lengths exceeding 30 feet, sound knots shall not exceed one-quarter the width of the face through which they project, and the grain shall not cross sufficiently to impair the strength.

### CLASSIFICATION AND GRADING RULES FOR LOCOMOTIVE, FREIGHT AND PASSENGER CAR OAK.

#### GENERAL INSTRUCTIONS.

Those who are not familiar with the anatomy of the oak tree should, when reading over these rules, take into consideration that the rule describes the poorest piece that goes into the grade and that a large percentage is above the grade described.

## DEFINITION OF OAK FOR CONSTRUCTION PURPOSES.

The term "Construction Oak" means all such products of Oak in which the strength and durability of the timber is the controlling element in its selection and use. The following is a list of products which are recommended for consideration as "Construction Oak":

## I.—CONSTRUCTION OAK.

- |     |   |   |
|-----|---|---|
| (A) | } | Cover Maintenance of Way Material.                |
| (B) |   |   |
| (C) |   |   |
| (D) |   |   |
| (E) |   | Locomotive Timbers: Sills, End and Truck Timbers. |
| (F) | } | Cover Maintenance of Way Material.                |
| (G) |   |   |
| (H) |   |   |
| (I) |   |   |
| (J) |   |   |
| (K) |   |   |
| (L) |   |   |
- (E) *Car Timbers:* Car Framing, including Upper Framing, Car Sills, End and Truck Timbers, Car Decking, Inside Lining.

## II.—STANDARD DEFECTS.

Definition of "Defect."—Fault, Blemish, Mark of Imperfection that will materially injure the strength.

Measurements which refer to the diameter of knots or holes shall be considered as referring to the mean or average diameter.

## II.—(A) KNOTS.

(1) *Sound Knot.* A sound knot is one which is solid across its face, and which is as hard as the wood surrounding it; it may be any color and contain checks.

(2) *Loose Knot.* A loose knot is one not firmly held in place by growth or position.

(3) *Pith Knot.* A pith knot is a sound knot with a pith hole not more than  $\frac{1}{4}$  inch in diameter in the center.

(4) *Rotten Knot.* A rotten knot is one that is not sound and not as hard as the wood surrounding it.

(5) *Pin Knot.* A pin knot is a sound knot not over  $\frac{3}{4}$  inch in diameter.

(6) *Standard Knot.* A standard knot is a knot not over 2 inches in diameter.

(7) *Large Knot.* A large knot is a sound knot more than 2 inches in diameter.

(8) *Round Knot.* A round knot is one which is oval or circular in form.

(9) *Spike Knot*. A spike knot is one sawn in lengthwise direction. The mean or average width shall be considered in measuring this knot.

(10) *Bird Peck*. Bruises apparently caused by bird pecks during the growth process of the timber. Considered no defect.



FIG. 1.— SOUND KNOT.

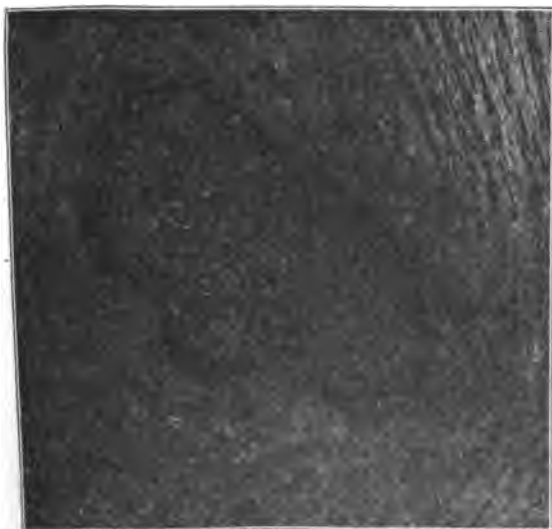


FIG. 2.— LOOSE KNOT.



FIG. 3.— PITH KNOT.



FIG. 4.— ROTTEN KNOT.



FIG. 5.— PIN KNOT.



FIG. 6.— STANDARD KNOT.

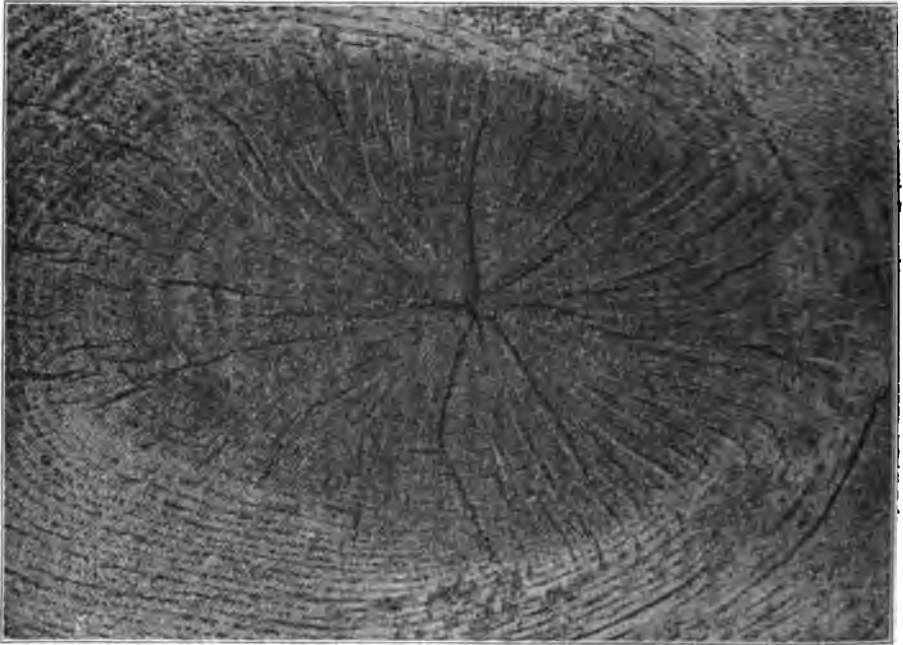


FIG. 7.—LARGE KNOT.

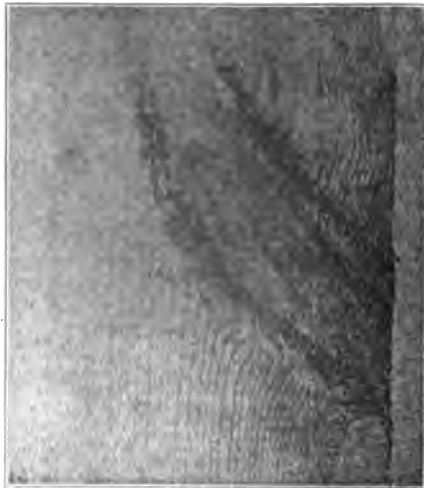


FIG. 8.—SPIKE KNOT.

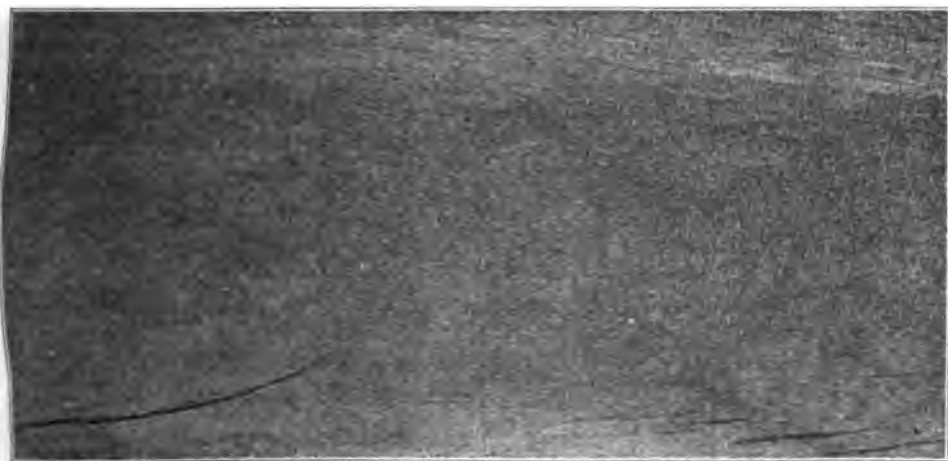


FIG. 9.—BURL KNOT.

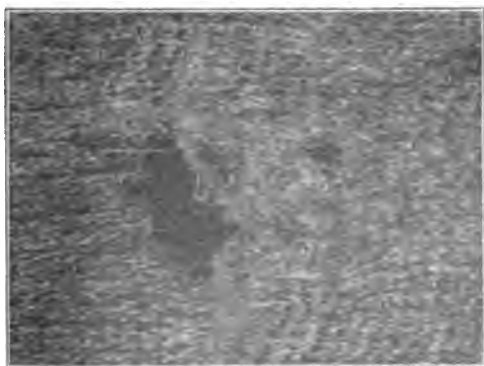


FIG. 10.—BIRD PECK.

## II.—(B) WORM DEFECTS.

(1) *Pin Wormholes.* Pin wormholes are very small holes caused by minute insects or worms. These holes usually are not over 1-16 inch in diameter, or smaller, and the wood surrounding them is sound and does not show any evidences of the wormhole having any effect on the wood other than the opening.

(2) *Spot Worm Defects.* (Also known as Flag Worm Defects.) Spot worm defects are caused, like pin wormholes, by minute insects or worms working on the timber during its growth. The size of the hole is about the same as pin wormholes, but the surrounding wood shows a colored spot as evidence of the defect. This spot is usually sound and does not affect the strength of the piece.

(3) *Grub Wormholes.* Grub wormholes are usually from about  $\frac{1}{8}$  to 3-16 inch in width and vary in length from about 3-16 inch to 1 inch, and are caused by grub worms working in the wood.

(4) *Wooden Rafting Pinholes.* This defect sometimes appears on river timber which has been rafted and holes bored in the solid wood for tying the timber, and a solid plug or pin driven in the hole filling it completely. These defects must be treated and considered the same as knot defects. Ordinary metal rafting pin or chain dog hole is considered no defect.



FIG. 1.—PIN WORM DEFECTS.

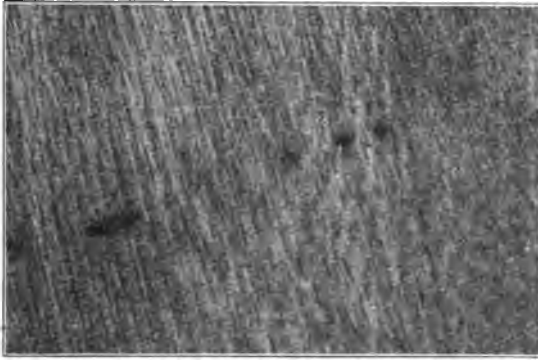


FIG. 2.— SPOT WORM DEFECTS.



FIG. 3.— METAL RAFTING PINHOLE.



FIG. 4.— GRUB WORMHOLES.



FIG. 5.—WOODEN RAFTING PINHOLES.

## II.—(C) SAP.

**Definition of "Sap."**—The alburnum of a tree—the exterior part of the wood next to the bark; sap wood not considered a defect.

**Sound Heart.** The term sound heart is used in these rules whenever heart of piece is split or opened and shows on outside of piece and its condition is sound and solid, not decayed. Openings between annual rings are checks not considered a defect.

## II.—(D) WANE.

Wane is bark or lack of wood from any cause on edges of timber.

## II.—(E) SHAKES.

**Definition of "Shakes."**—Shakes are splits or checks in timber which usually cause a separation of the wood between the annual rings.

(1) *Ring Shakes.* Ring shakes are openings between the annual rings usually showing only on the end of the timber.

(2) *Through Shakes.* Through shakes are shakes which extend between two faces of the timber.

(3) *Checks.* A small crack in the wood due to seasoning; not considered a defect.

## II.—(F) GRAIN.

***Crooked or Cross Grain.*** Crooked or cross grain occurs where the grain crosses the piece within a section of 24 inches in running length of the piece. This is only considered a defect in certain smaller sizes of dimension for specific purposes.

## II.—(G) Rot.

Any form of decay which may be detected as giving the timber a doty or rotten texture is a rot defect, including what is commonly known as dry rot. Water stain, or what are sometimes called scalded or burned spots, usually caused by timber lying in the water under certain conditions before it is sawed, and burned spots where the timber is improperly piled green, not considered defects, as they do not affect the strength of the piece.

## III.—STANDARD NAMES FOR CONSTRUCTION OAK.

Standard names for Construction Oak timbers; White Oak and Red Oak. Unless specially mentioned, these terms include the following:

*White Oak.*

White Oak.  
Burr or Mossy Cup Oak.  
Rock Oak.  
Post or Iron Oak.  
Overcup.  
Swamp Post Oak.  
Live Oak.  
Chestnut or Tan Bark Oak.  
Basket or Cow Oak.  
Yellow or Chinquapin Oak.

*Red Oak.*

Red Oak.  
Pin Oak.  
Black Oak.  
Water Oak.  
Willow Oak.  
Spanish Oak.  
Scarlet Oak.  
Turkey Oak.  
Black Jack or Barn Oak.  
Shingle or Laurel Oak.

Term: Mixed Oak means any kind of oak.

## IV.—STANDARD SPECIFICATIONS FOR STRUCTURAL OAK TIMBERS.

(1) *General Requirements.* Except as noted, all structural timbers shall be white oak, to be sound timber and sawed specified sizes; free from ring shakes, crooked grain, rotten knots, large knots in groups, rot, dote and wane in amounts greater than allowed in these specifications.

(2) *Boxed Hearts.* Boxed hearts are permitted in pieces 5 by 5 square and larger. The center of the heart shall be boxed as near the center of the piece as practical, and not to exceed 30 per cent of the pieces can have the center of the heart nearer than  $1\frac{1}{2}$  inches from any face; 20 per cent may show one heart face, corner or edge, not to exceed 75 per cent of the length of the piece.

## IV.—(3) WANE.

## EXPLANATION.

The term 20 per cent of number of pieces or amount shipped refers to each item and size of each car shipped.

(a) Pieces 5 by 5 to 8 by 8 square may show 1 inch wane, side measurement on any two corners or edges, and this wane not to exceed more than 25 per cent of the length of the piece singly, or 50 per cent in

aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 50 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(b) Pieces over 8 by 8, including 12 by 12, square may show  $1\frac{1}{2}$  inches wane, side measurement, edge of any two corners or edges, and this wane not to exceed more than  $33\frac{1}{3}$  per cent of the length of the piece singly, or  $66\frac{2}{3}$  per cent in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane  $66\frac{2}{3}$  per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(c) Pieces over 12 by 12 square may show  $1\frac{3}{4}$  inches, side measurement, any two corners or edges, and this wane not to extend more than 40 per cent of the length of the piece singly, or 80 per cent in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 80 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(d) In event that pieces have two faces as wide as above described and two faces narrower, the proportion of the amount of wane is admissible.

(e) Pieces 1 inch to 5 inches thick, not exceeding 8 inches wide, are governed by defect specifications above mentioned, with the exception that they shall not contain wane, and not to exceed 20 per cent of pieces 2 inches and thicker may show sound heart on one face; pieces under 2 inches thick must be free of heart. Pieces 8 inches and wider may contain wane as per paragraphs b and d.

(f) Rough sizes of structural timber shall not vary more than  $\frac{1}{4}$  inch scant of specified size. Dressed sizes may be  $\frac{1}{2}$  inch scant after dressing.

#### V.—(B) LOCOMOTIVE TIMBER OAK. PASSENGER CAR DIMENSION OAK. REFRIGERATOR CAR DIMENSION OAK.

Thickness cut to order, widths cut to order, lengths cut to order. Unless otherwise noted, must be cut from white oak. This stock, wherever practical, should be cut outside the heart and must be free of heart shake in pieces under 6 by 6 square. No attempt should be made to box the heart in pieces smaller than 5 by 7, unless heart is very small and tight. When heart is well boxed it must be firm and tight, and the center of the heart must not be nearer than 2 inches from any face. Must be sawed full to sizes with square edges, and cut from sound timber and free from wormholes, with the exception of a few small pin wormholes well scattered, and an occasional spot worm. None of these defects, however, to affect the serviceability of the piece for the purpose intended. Must be free from split, rot or dote, large, loose, rotten or unsound knots, or, in other words, free of all defects affecting the strength and durability of the piece. Sound standard knots well scattered not considered a defect.

## V.— (C) FREIGHT CAR TIMBER.

Freight car dimensions, including all cars other than refrigerator and passenger cars. Sizes cut to order. Unless otherwise ordered, must be sawed from good merchantable white or red oak timber. This stock must be free of rot, shakes and splits, large, loose, rotten or unsound knots, any of which will materially impair the strength and durability of the piece for the purpose intended. This stock is intended to work full size and length without waste for side posts, braces and end sills, end plates, drafting timbers, cross ties, etc., used in the construction of ordinary freight or stock cars. On pieces 3 by 4 inches or equivalent girth measurement and larger (nothing under 2 inches thick), heart check showing on one corner, admitted on twenty per cent of the pieces in each car shipment. Well-boxed, sound hearts admitted in this material in pieces 5 by 6 and larger.

On pieces 3 by 4 to 6 by 6, inclusive, or equivalent girth measurement and larger (nothing under 2 inches thick), in absence of heart defects, wane on one corner,  $\frac{3}{4}$  inch side measurement, admitted on not to exceed twenty per cent of the number of pieces in each car shipment.

Pieces over 6 by 6 square may contain 1 inch wane, side measurement, on one corner, with other conditions same as 3 by 4 to 6 by 6 sizes

CLASSIFICATION AND GRADING RULES FOR DOUGLAS FIR  
CAR AND LOCOMOTIVE MATERIAL.

1. The term "Douglas Fir" will cover the timber known likewise as Yellow, Red, Western, Washington, Oregon or Puget Sound Fir or Pine, Norwest and West Coast Fir.

2. *Douglas Fir Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Douglas Fir are knots, knotholes, splits, checks, wane, rot, rotten streaks, wormholes, dog or picaroon holes, pitch seams, shake, pitch pockets, chipped grain, torn grain, loose grain, solid pitch, stained heart, sap stain and imperfect manufacture.

## KNOTS.

4. Knots shall be classified as pin, small, standard and large, as to size; round and spike, as to form, and tight, loose and rotten, as to quality.

5. A pin knot is tight and not over  $\frac{1}{2}$  inch in diameter.

6. A small knot is tight and not over  $\frac{3}{4}$  inch in diameter.

7. A standard knot is tight and not over  $1\frac{1}{2}$  inches in diameter.
8. A large knot is tight and any size over  $1\frac{1}{2}$  inches in diameter.
9. A round knot is oval or circular in form.
10. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

11. A tight knot or sound knot is one solid across its face, is as hard as the wood it is in, and is so fixed by growth or position that it will retain its place in the piece.

12. A loose knot is one not held firmly in place by growth or position.

13. A rotten knot is one not as hard as the wood it is in.

(See Exhibit D — Douglas Fir.)

#### EXHIBIT D — DOUGLAS FIR.



FIG. 1.— STANDARD KNOT.

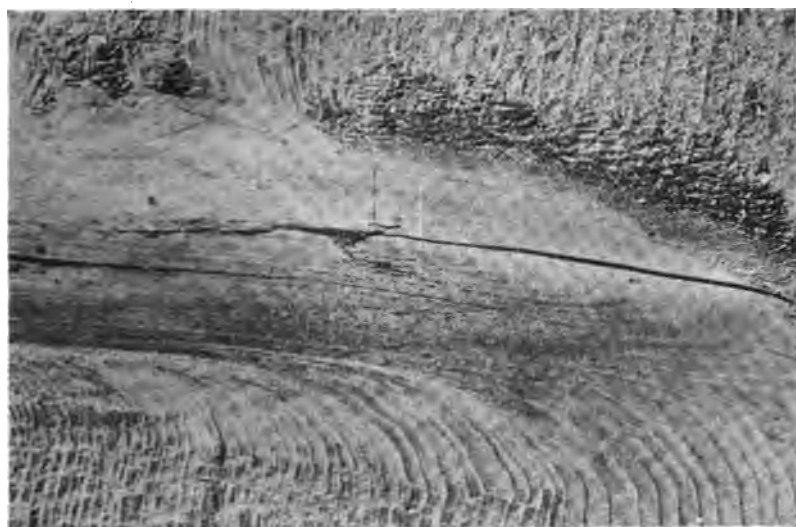


FIG. 2.— LARGE SPIKE KNOT.

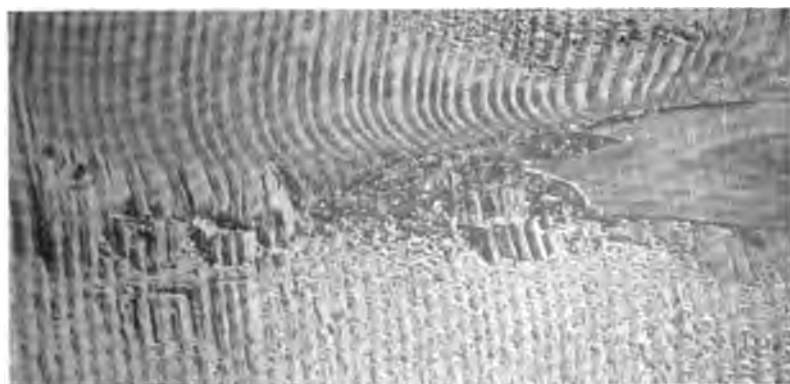


FIG. 3.— SMALL SPIKE KNOT.

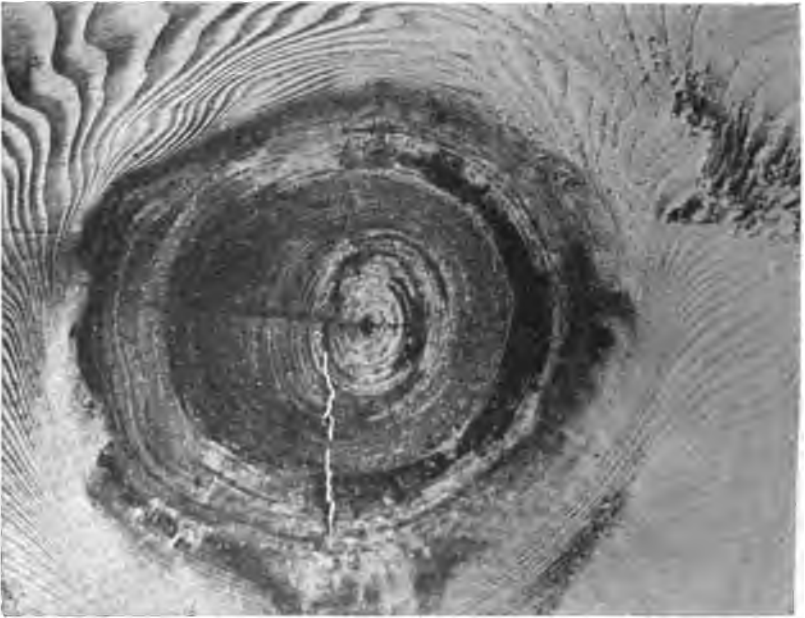


FIG. 4.— LARGE KNOT.



FIG. 5.— SMALL KNOT.

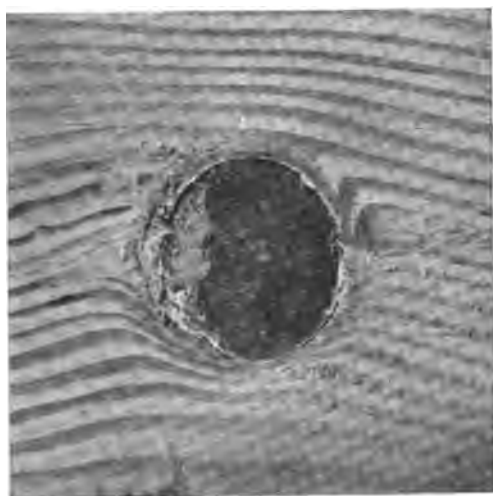


FIG. 6.— LOOSE KNOT.

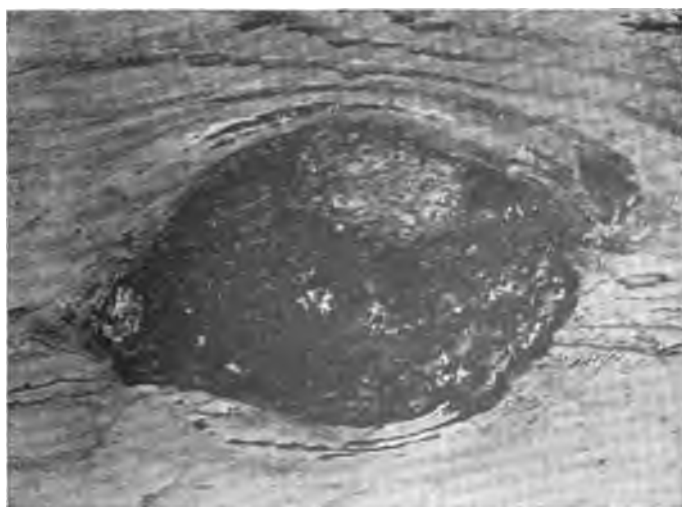


FIG. 7.— ROTTEN KNOT.



FIG. 8.—PITH KNOT.



FIG. 9.—PIN KNOT.

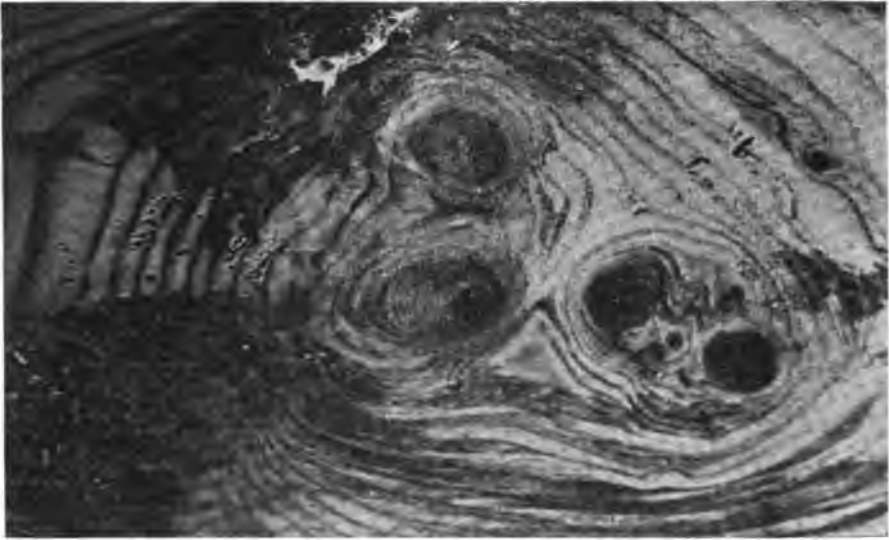


FIG. 10.— CLUSTER OF KNOTS.

#### PITCH.

14. Pitch pockets are openings between the grain of the wood, containing more or less pitch and surrounded by sound grain wood; they shall be classified as small, standard and large pitch pockets.

15. A small pitch pocket is one not over  $\frac{1}{8}$  of an inch wide.

16. A standard pitch pocket is one not over  $\frac{3}{8}$  of an inch wide, or 3 inches in length.

17. A large pitch pocket is one over  $\frac{3}{8}$  of an inch wide or over 3 inches in length.

18. A pitch shake or seam is a clearly defined opening between the grain of the wood and may be either filled with granulated pitch or not, but in either case is considered a defect in any of the grades hereinafter described.

19. A pitch streak is a well-defined accumulation of pitch at one point in the piece, and when not sufficient to develop a well-defined streak, or where fiber between grains is not saturated with pitch it shall not be considered a defect.

20. A small pitch streak shall be equivalent to not over one-twelfth the width and one-sixth the length of the piece it is in.

21. A standard pitch streak shall be equivalent to not over one-sixth the width and one-third of the length of the piece it is in.



FIG. 1.—SOLID PITCH.



FIG. 2.—LARGE OPEN PITCH POCKET.

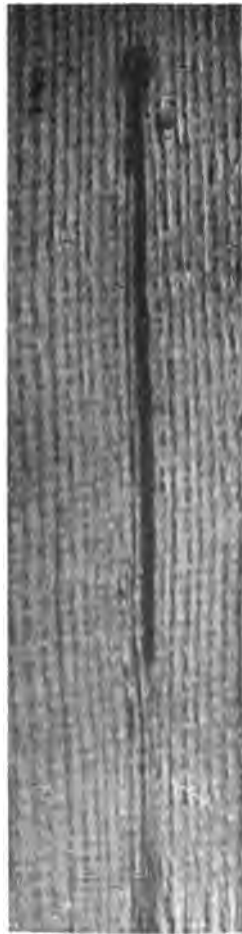


FIG. 3.— SMALL CLOSED PITCH POCKET.



**FIG. 4.—SMALL PITCH STREAK.**

## WANE.

22. Wane is bark, or the lack of wood, from any cause on edge.

## SAP.

23. Bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

24. Sap stain shall not be considered a defect, except as provided herein.

25. Discoloration of the heart of the wood, or stained heart, must not be confounded with rot or rotten streaks. The presence of rot is indicated by decided softness of the wood where it is discolored or by small white spots resembling pin wormholes.

## MISCELLANEOUS.

26. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

27. All stock, except car sills and framing, shall be inspected on the face side to determine the grade. Stock surfaced one side, the dressed surface shall be considered the face side. Stock rough or dressed two sides, the best side shall be considered the face, but the reverse side of all such stock shall not be more than one grade lower.

28. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found, should not be classed as torn grain, and shall be considered a defect only when it unfits the piece for use intended.

29. Torn grain consists of a part of the wood being torn out in dressing. It occurs around knots and curly places, and is of four distinct characters—slight, medium, heavy and deep.

30. Slight torn grain shall not exceed 1-32 of an inch in depth; medium 1-16 of an inch, and heavy 1/8 of an inch. Any torn grain heavier than 1/8 of an inch shall be termed deep.

31. Loosened grain consists in a point of one grain being torn loose from the next grain. It occurs on the heart side of the piece, and is a serious defect, especially in flooring.

32. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* piece *such grades may contain*, but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

33. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

34. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

35. Equivalent means equal, and in construing and applying these rules, the defects allowed, whether specified or not, are understood to be equivalent in damaging effect to those mentioned applying to stock under consideration.

36. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

37. The foregoing general observations shall apply to and govern the application of the following rules:

The rules referred to under Sections 38, 39 and 40 govern 4-inch or 6-inch strips, and are intended to cover strips used for car siding, car roofing and car lining.

The term "Edge Grain" is here used an synonymous with vertical grain, rift-sawn, or quarter-sawed. The term "Flat Grain" is synonymous with slash grain or plain sawed.

*No. 2 Clear and Better Edge Grain.*

38. Material of this grade shall be well manufactured, with angle of grain not less than forty-five degrees. This stock shall be kiln-dried and practically free from all defects, but will admit of bright sap on the face; not exceeding three small close pitch pockets not over 2 inches long, one pin knot, slight roughness in dressing, but not a serious combination of these defects.

*No. 2 Clear and Better Flat Grain.*

39. Material of this grade shall be well manufactured. The stock shall be kiln-dried and practically free from all defects, but will admit of bright sap on the face; not exceeding three small close pitch pockets not over 2 inches long, one pin knot, slight roughness in dressing, but not a serious combination of these defects.

*No. 3 Clear.*

40. Material of this grade shall be sound common lumber and will admit of roughness in dressing, bright sap, and also may contain five pin, three small and one standard knot and five pitch pockets in any continuous 5 feet of length of the piece; or any combination of tight knots or pitch pockets equivalent to those mentioned above. This grade particularly refers to stock used for inside lining of freight cars.

*Standard Car Decking or Flooring.*

41. Material of this grade shall be well manufactured from sound live timber and shall be free from splits, shakes, rot, bark or waney edges, and unsound knots, or pitch pockets, pitch seams or large knots which would weaken the piece for the use intended. This grade will admit of sound knots not to exceed one-third width of the piece, provided they are not in clusters, and sap.

*Common Car Sills and Framing.*

42. Material of this grade shall be well manufactured from sound live timber, sawed full size to sizes ordered and free from rot, unsound knots, cross grain, bark or waney edges or shakes, but will admit of sap and any number of sound knots, provided they are not in clusters, and do not exceed one-third width of piece; pitch pockets or pitch seams that would not weaken the piece for the purpose intended.

43. *Sizes* up to 6 inches in width shall measure full when green, and not more than  $\frac{1}{8}$  inch scant when dry or part dry. Sizes 6 to 12 inches in width shall measure full when green and not more than  $\frac{1}{4}$  inch scant when dry or part dry. Sizes 12 to 16 inches in width shall measure full when green and not more than  $\frac{3}{8}$  inch scant when dry or part dry. Unless otherwise specified,  $\frac{1}{4}$  inch shall be allowed for each side which is to be dressed. In pieces 3 by 6 inches and under when ordered in lengths exceeding 30 feet, sound knots shall not exceed one-quarter the width of the face through which they project, and the grain shall not cross sufficiently to impair the strength.

*44. Standard Lengths.*

CAR SIDING—8, 9, 10 and 12 feet or multiples.

CAR ROOFING—5 feet or multiples.

CAR LINING—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

CAR DECKING—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped, except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

## CLASSIFICATION AND GRADING RULES FOR CYPRESS CAR MATERIAL.

1. *Cypress* to cover Red, Gulf, Yellow and East Coast Cypress, also known as Bald Cypress.

2. *Cypress Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Cypress are knots, knotholes, sap, wormholes, shake, season checks, splits and wane.

**KNOTS.**

4. Knots shall be classified as standard and small, as to size, and sound or rotten, as to quality.

5. A standard knot is sound and not to exceed  $1\frac{1}{4}$  inches in diameter.

6. A small knot is one not exceeding  $\frac{3}{4}$  inch in diameter.

7. A sound knot is one solid across its face, is as hard as the wood it is in.

8. A rotten knot is one not as hard as the wood it is in.

EXHIBIT F—CYPRESS.



FIG. 1.—STANDARD SOUND KNOT.



FIG. 2.—SMALL SOUND KNOT.

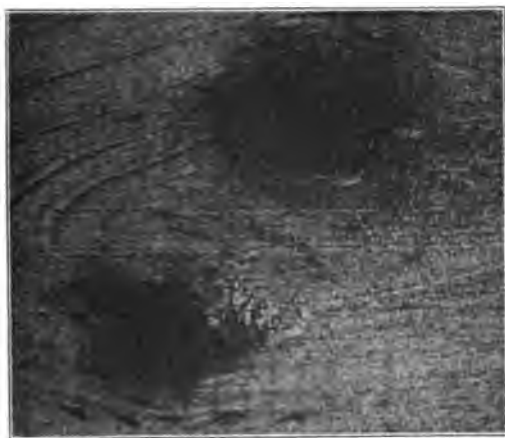


FIG. 3.—TWO SMALL SOUND KNOTS EQUAL TO ONE STANDARD KNOT.



FIG. 4.—ROTTEN KNOT.

## SAP.

9. Stained sap or bright sap shall not be considered a defect in the material specified in these rules.

## SEASON CHECKS.

10. Ordinary season checks are such as occur in lumber properly covered on yard or season checks of equal size in kiln-dried lumber.

## WANE.

11. Wane is bark or lack of wood from any cause on edge.

## MISCELLANEOUS.

12. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest pieces such grade may contain*, but the average quality of the grade shall be better than the coarsest pieces allowed in the grade.

13. Lumber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

14. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

15. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

16. The foregoing general observations shall apply to and govern the application of the following rule. The rule referred to in the following section is intended to govern 4-inch or 6-inch strips and to cover strips used for car siding, car roofing and car lining.

## CAR ROOFING AND SIDING.

"C and Better" Grade.—This grade will admit sound knots, stained sap, pin worm holes, very slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car roofing and car siding; may be random or specified lengths and may be worked to pattern specified and graded from pattern side or S2S and C. M. and graded from the better side.

## CAR LINING.

Shall be specified widths and 8 to 20 inches in length. Will admit tight knots, stained sap, pin wormholes, slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car-lining purposes.

## TRAIN LIGHTING.

## RECOMMENDED PRACTICE.

Sheets M. C. B.—U to U-9.

In 1912 the following specifications were adopted for electric lighting of passenger equipment cars. Revised 1913.

## GENERAL.

1. That in electrically lighted cars the following voltages should be used:

60 volts (nominal) for straight storage, head-end and axle-dynamo systems.

30 volts (nominal) for straight storage and axle-dynamo systems.

2. That each electrically lighted car be provided with a notice giving the following information, and that this notice shall be posted in the switch-board locker:

\*System.

Type of generator.

Type of regulator.

Voltage of system.

Ampere hours capacity of battery at 8-hour rate.

Number of sets of battery in parallel.

Nominal charging rate ..... amps. .... max. amps.

Size of train line wires — B. & S.

Number of train line wires — (2 or 3).

Capacity of generator ..... amps.

Axle pulley ..... in. diam.

Generator pulley ..... in. diam.

Length of belt ..... ft. .... in.

Wiring diagram (show location and capacity of fuses).

3. That the rules of fire underwriters shall cover all car wiring.

4. That all wiring under car to the switchboard shall be run in conduits.

5. Standard lamps for car-lighting service should be in accordance with dimensions as shown on Sheet M. C. B. U<sub>9</sub>.

6. That where train-line connectors are used, a connector having dimensions as shown on Sheet M. C. B.—U shall be used and located as shown on Fig. 1, with connections to dynamo, battery and jumper as shown on Fig. 2.

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\* State whether axle dynamo, straight storage, and if used on head-end system.

LOCATION OF CONNECTOR AND ARRANGEMENT OF  
TERMINALS WHEN FACING CAR.

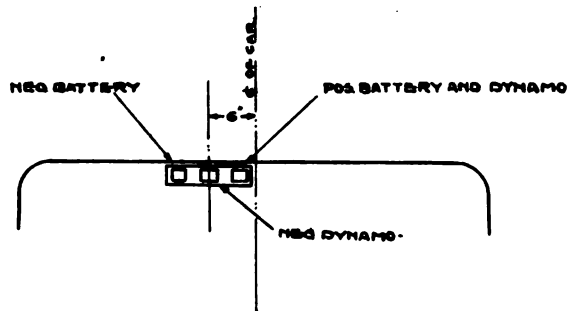


FIG. 1.

CONNECTION OF BATTERY TO TRAIN LINE.

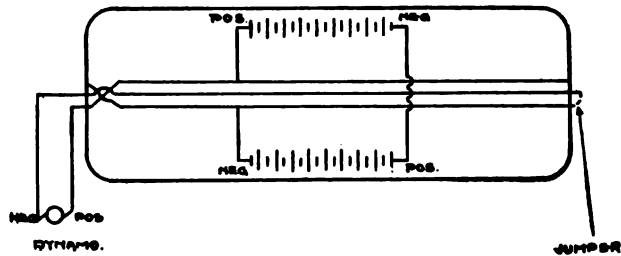


FIG. 2.

If only two wires are used they shall be connected to the outside terminals and the female connector on each end of the car shall be stenciled: "Not for use on head-end system."

7. That each electrically lighted car equipped with batteries shall be provided with two charging receptacles with swivel supports, as shown in detail on Sheets M. C. B.—U<sub>1</sub>, U<sub>2</sub> and U<sub>3</sub>, installed on each side of the car as shown on Sheet M. C. B.—U<sub>4</sub>, the outside annular ring to be the positive.

## CONTROL AND PROTECTION OF PARTS.

8. That each electrically lighted car shall be provided with a switchboard upon which shall be mounted switches, fused switches or terminals. The switches, fuses or terminals to protect and completely disconnect the following parts:

- (a) Train line.
- (b) Battery.
- (c) Axle dynamo.
- (d) Circuits for lamps, fans, etc.

The axle-dynamo terminals to control the positive and negative armatures and the positive field of the dynamo. Each of the above switches, fuses or terminals to be plainly marked, designating the part controlled, the positive terminal to be on the right side facing the board.

9. Where a main lamp switch is used, or where fuses controlling all lamps are used, they shall be so stenciled in plain letters.

10. The switchboard or regulator panels of electrically lighted cars shall be provided with fuses for the protection of the parts given below and with the type of terminal as specified.

- (A) Train Line.—Terminals for reception of flat fuses shall be provided  $2\frac{1}{2}$  inches between centers; stud or screw to be  $\frac{1}{4}$  inch diameter with 20 threads per inch.
- (B) Battery.—Optional. Fuse terminals, if used, shall be same as for train line.
- (C) Main Line Switch.—Optional. Fuse terminals, if used, shall be same as for train line.
- (D) Circuits.—For lamps, fans, etc., fuse shall be of the Edison screw-shell type for both positive and negative.
- (E) Axle Generator.—Positive armature fuse terminal; terminals to have N. E. C. code standard 150 amperes knife-blade contact clips mounted with 4-inch clearance between clips.
  - (a) Axle Generator.—Negative armature fuse terminal optional. If used, terminal shall be same as positive.
  - (b) Axle Generator.—Positive field optional. If used, to have ferrule type clip mounted with 1-inch clear space between clips and to take N. E. C. code standard, 0 to 30 amperes.

NOTE.—Capacity of fuses, as designated above, to be such as to properly protect the parts in question.

11. That each electrically lighted car equipped with battery box or boxes shall have provided a fuse block, mounted in a suitable metal box

at the positive and negative terminals of each set of batteries, and that the fuse block shall be in accordance with the detail as shown on Sheet M. C. B.—U5, and installed on the car substantially as shown on Sheet M. C. B.—U4. Knife-blade fuses shall be provided with a capacity of between 101 and 200 amperes.

12. That where axle dynamos are used, negative, positive and dynamo field shall be fused as close as possible to the dynamo and prior to the said leads either entering the conduits or being secured to the bottom of the car. The above fuses to be used for emergency service only and to be at least one hundred per cent above the capacity of the fuses on the switchboards protecting the same leads.

13. All wires or terminals must be marked for identification.

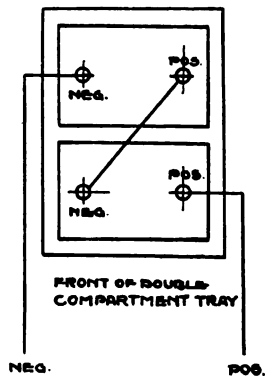
#### BATTERIES.

14. That batteries as a set shall be connected up with a positive pole to the right, facing the car as shown in Fig. 2.

15. Where lead storage batteries are used they shall be preferably installed in double compartment tanks substantially as shown on Sheets M. C. B.—U6, U7 and U8.

16. That where double compartment tanks are used, the connections and arrangements of battery terminals are to be as shown on Fig. 3.

#### CONNECTION AND ARRANGEMENT OF TERMINALS IN DOUBLE COMPARTMENT TRAY.



NOTE:  
WHEN WELDONHOUSE WIRE CONNECTORS  
ARE USED MALE HEADS TO BE USED FOR POS.  
FEMALE HEAD FOR NEG. TERMINAL.

FIG. 3.

17. Battery boxes shall have provided in each door a vent, substantially as shown on Sheet M. C. B.—U9.

In 1913 the following was adopted:

Battery boxes with two compartments each 22 $\frac{5}{8}$  inches long, or with one compartment 3 feet 9 $\frac{1}{4}$  inches, must be designed to safely carry a battery weight of 1,600 pounds.

Battery boxes with four compartments each 22 $\frac{5}{8}$  inches long, or two compartments each 3 feet 9 $\frac{1}{4}$  inches long, must be designed to carry a battery weight of 3,200 pounds.

#### AXLE DYNAMO.

18. That a straight pulley seat be provided for the axle pulley. That if a bushing or sleeve be used it should preferably be secured to the axle, independent of the pulley. Bushing to have an external diameter of 7 $\frac{1}{2}$  inches and to be 8 $\frac{1}{2}$  inches long, turned straight. That the pulley hub have a uniform internal diameter of 7 $\frac{1}{2}$  inches, the length of the hub to be 6 $\frac{1}{2}$  inches, the face of the pulley to be 9 inches or wider if flangeless, and 8 inches if flanged. That the generator pulley be flanged, crowned and perforated, and have a 7-inch face.

In 1913 the following was adopted:

The diameter of axle pulleys should preferably be 17 inches or 21 inches; the diameter of the generator pulley should preferably be 8 inches or 11 inches.

19. That when facing the end of the truck on which axle generator is mounted, the pulley or sprocket shall be on the right-hand side.

The electric connector between the dynamo leads and permanent wiring on the car should be made with non-reversing, self-locking receptacle and plug.

#### AXLE-DYNAMO SUSPENSION.

#### RECOMMENDED PRACTICE.

In 1913 the following specifications for axle-dynamo suspensions were adopted:

20. Axle-dynamo suspensions must be designed so that with full diameter wheels and truck, on straight, level track, any part of the dynamo or suspension must have a clearance not less than 6 inches above top of rail, and a clearance of at least 3 $\frac{1}{2}$  inches between any part of the mechanism attached to the car body.

21. In axle-dynamo suspension the metal carrying the weight of the dynamo must not be subjected to wear.

22. In axle-dynamo suspensions, if side arms are used, the end to be secured to the truck frame must extend under the transom and be bolted to the side frame near the transom, and if carried through or over end

sill must be held securely to end sill by a hooked bolt not less than  $\frac{3}{4}$  inch in diameter.

23. When possible, the belt should go over the end sill and under the brake beam, with belt clearance of at least an inch.

24. A typical design covering the general requirements in the above recommendations is shown on Sheet M. C. B. —, and is recommended where applicable.

#### SPECIFICATIONS FOR CAST-STEEL TRUCK SIDES.

#### RECOMMENDED PRACTICE

In 1912 specifications for cast-steel truck sides were adopted as follows:

1. When the manufacturer is ready to make a shipment of material he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he shall furnish free any assistance and labor needed to make satisfactory inspection test and prompt shipment.

2. Manufacturer shall protect all castings, so that they do not become covered with rust.

3. **CLEANING.**—At his option the inspector may require that any or all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

4. **PAINTING.**—They shall not be painted before being inspected unless otherwise specified.

#### I. MANUFACTURE.

5. **PROCESS.**—Castings furnished under these specifications shall be made by the open-hearth process in accordance with the best foundry methods.

#### II. CHEMICAL PROPERTIES AND TESTS.

6. **CHEMICAL COMPOSITION.**—The steel shall conform to the following requirements as to chemical composition:

Carbon .....	not below 0.20 or above 0.30 per cent
Manganese .....	not above 0.70 per cent
Phosphorus .....	not above 0.05 per cent
Sulphur .....	not above 0.05 per cent

7. **LADLE ANALYSIS.**—To determine whether the material conforms to the requirements specified in section 6 an analysis shall be made by the manufacturer, from test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than  $\frac{1}{4}$  inch beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser.

8. **CHECK ANALYSIS.**—A check analysis may be made by the purchaser from a test coupon, representing each melt, and this analysis shall conform to the requirements of section 6.

9. **SAMPLING FOR CHEMICAL ANALYSIS.**—From the coupon described in section 12 (a), which has satisfactorily passed the physical requirements, borings shall be taken for chemical analysis.

### III. PHYSICAL PROPERTIES AND TESTS.

10. **PHYSICAL PROPERTIES.**—The physical properties of steel shall be as follows:

- (a) Ultimate tensile strength, lbs. per sq. in., not under 60,000.
- (b) Yield point (by "drop of beam"), not under 50 per cent of ultimate tensile strength.
- (c) Elongation in 2 in. per cent not less than 1,400,000 divided by the ultimate tensile strength.

11. **ANNEALING.**—Test coupons shall be annealed with the castings before they are detached. To determine the quality of annealing, the inspector will have one of the test coupons mentioned in section 12 (b) cut half way through and broken off from the casting for examination of the fracture. If, in his opinion, the annealing has not been properly done, he may require the casting to be reannealed, using the second test coupon for examination in this case. If after annealing or reannealing any casting is so much out of gauge as to require heating in order to bring it within the gauge it shall again be reannealed before it may be accepted.

12. **SAMPLING.**—For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random one casting from each melt. From this casting the two physical and chemical test coupons shall be removed by the inspector, one of them shall be subjected to physical test, but if the coupon casting proves unsound the other coupon shall be used in its stead for this purpose.

(a) **PHYSICAL TEST COUPONS.**—The manufacturer shall have cast on each truck side two test coupons having a cross section of  $1\frac{1}{8}$  by  $1\frac{1}{8}$  in. and 6 in. long. These coupons are to be used for physical and chemical tests and their location upon the casting shall be specified by the purchaser.

(b) **ANNEALING COUPON.**—There shall be two additional coupons of a cross section not less than the average cross section of the casting. These coupons are to be used to determine the character of the annealing as specified in section 11.

### IV. WEIGHTS.

13. **VARIATION IN WEIGHTS.**—Truck sides shall not vary more than 3 per cent above or 2 per cent below what has been determined as the normal weight of the casting except that in case the casting has met all requirements save that of overweight, it may be accepted at the maximum allowable weight here specified. For the purpose of this requirement the normal weight shall be previously agreed upon between the purchaser and the manufacturer.

## V. WORKMANSHIP.

14. WORKMANSHIP.—They shall conform to the dimensions shown on the drawings and shall be free from rust, scale, blowholes and shrinkage cracks.

## VI. MARKING.

15. MARKING.—Each casting shall have the following markings cast upon it in raised letters and figures:

- (a) Initials of Railroad Company.
- (b) Month and year when cast, thus, 6-12.
- (c) Manufacturers' serial number and trade mark (or other designation).
- (d) M. C. B. S.

## VII. REJECTION.

16. REJECTION.—In case the test pieces selected do not meet the specifications, all castings from the entire melt shall be rejected.

17. REMOVAL OF S.—From each casting rejected by inspector under these specifications, he shall cause to be chipped the "S" of the letters M. C. B. S. which are specified in section 15 (d).

## SPECIFICATIONS FOR CAST-STEEL BOLSTERS.

## RECOMMENDED PRACTICE

In 1912 the following specifications were adopted for cast-steel bolsters:

1. When the manufacturer is ready to make a shipment of material he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he shall furnish free any assistance and labor needed to make satisfactory inspection test and prompt shipment.

2. The manufacturer shall protect all castings so that they do not become covered with rust.

3. CLEANING.—At his option the inspector may require that any all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

4. PAINTING.—They shall not be painted before being inspected unless otherwise specified.

## MANUFACTURE.

5. PROCESS.—Castings furnished under these specifications shall be made by the open-hearth process in accordance with the best foundry methods.

## I. CHEMICAL PROPERTIES AND TESTS.

6. **CHEMICAL COMPOSITION.**—The steel shall conform to the following requirements as to chemical composition:

Carbon .....	not below 0.20 or above 0.30 per cent
Manganese .....	not above 0.70 per cent
Phosphorus .....	not above 0.05 per cent
Sulphur .....	not above 0.05 per cent

7. **LADLE ANALYSIS.**—To determine whether the material conforms to the requirements specified in section 6, an analysis shall be made by the manufacturer from test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than  $\frac{1}{4}$  inch beneath the surface of the test ingot. A copy of this analysis shall be given to the purchaser.

8. **CHECK ANALYSIS.**—A check analysis may be made by the purchaser from a test coupon representing each melt, and this analysis shall conform to the requirements of section 6.

9. **SAMPLING FOR CHEMICAL ANALYSIS.**—From the coupon described in section 12 (a), which has satisfactorily passed the physical requirements, borings shall be taken for chemical analysis.

## II. PHYSICAL PROPERTIES AND TESTS.

10. **PHYSICAL PROPERTIES.**—The physical properties of the steel shall be as follows:

Ultimate tensile strength, lbs. per sq. in., not less than 60,000.

Yield point (by drop of beam), not less than 50 per cent of the ultimate tensile strength.

Elongation in 2 in. per cent, not less than 1,400,000 divided by the ultimate tensile strength.

11. **ANNEALING.**—All castings shall be thoroughly annealed. Test coupons shall be annealed with the casting, before they are detached. To determine the quality of annealing, the inspector will have one of the test coupons mentioned in section 12 (b) cut half way through and broken off from the casting for examination of fracture. If, in his opinion, the annealing has not been properly done, he may require the castings to be reannealed, using the second test coupon for examination in this case. If after annealing or reannealing any casting is so much out of gage as to require heating in order to bring it within the gage, it shall again be annealed before it may be accepted.

12. **SAMPLING.**—For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random one casting from each melt. From this casting the two physical and chemical test coupons shall be removed by the inspector, one of them shall be subjected to physical test, but if the coupon casting

proves unsound the other coupon shall be used in its stead for this purpose.

(a) **PHYSICAL TEST COUPONS.**—The manufacturer shall have cast upon each bolster two test coupons having a cross section of  $1\frac{1}{8}$  by  $1\frac{1}{8}$  in. and 6 in. long. These coupons are to be used for physical and chemical test and their location upon the casting shall be specified by the purchaser.

(b) **ANNEALING COUPONS.**—There should be two additional coupons of a cross section not less than the average cross section of the casting, which coupons are to be used to determine the character of the annealing as specified in section 11.

### III. WEIGHTS.

13. **WEIGHTS.**—Bolsters shall not vary more than 3 per cent above nor 2 per cent below that which has been determined upon as the normal weight of the casting, except that in case the casting has met all requirements save that of overweight, it may be accepted at the maximum allowable weight here specified. For the purpose of this requirement the normal weight shall be previously agreed upon between the purchaser and the manufacturer.

### V. MARKING.

15. **MARKING.**—Each casting shall have the following markings cast upon it in raised letters and figures:

- (a) Initials of Railroad Company.
- (b) Month and year in which cast, thus, 6-12.
- (c) Manufacturer's serial number and trade marks (or other designation).
- (d) M. C. B. S.

### IV. WORKMANSHIP AND FINISH.

14. **WORKMANSHIP.**—They shall conform to the dimensions shown on drawings and shall be free from rust, scale, blowholes and shrinkage cracks.

### VI. REJECTION.

16. **REJECTION.**—In case the test pieces selected do not meet the specifications, all castings from the entire melt shall be rejected.

17. **REMOVAL OF S.**—From each casting rejected by the inspector under these specifications he shall cause to be chipped the "S" of the letters M. C. B. S. which are specified in section 15 (d).

## MISCELLANEOUS.

The following items, formerly among the Standards, are given on account of the recommendations of the Association and the information contained:

## DICTIONARY OF TERMS.

At the Fifth Annual Convention, held in Richmond, Virginia, in 1872 (*see page 18 of the report of that meeting*), it was

"*Resolved*, That a committee be appointed with power to publish an illustrated book, defining the proper terms or names of each and every part used in the construction of railway cars, and a description of the use of the same."

At the Fourteenth Annual Convention, held in Detroit in 1880 (*see pages 11 to 20 of the report of that meeting*),

"The committee to which was assigned the duty of preparing a dictionary of terms used in the construction of cars submitted a copy of the book and reported that it had finished its work, and it was discharged."

## ENTERTAINMENTS.

At the Ninth Annual Convention, held in New York in 1875, the following resolution was adopted (*see page 113 of the report of that meeting*):

"*Whereas*, The practice of entertaining the members of this Association by its friends has become an established custom, and has thus assumed somewhat the character of an obligation to which those who have so generously dispensed hospitality have in a measure felt themselves obliged to conform; and

"*Whereas*, The expenditure of time and money for this purpose has in many cases been very much greater than the members of this Association have a right to expect should be devoted to their enjoyment; and

"*Whereas*, The expense of such hospitality has in some cases been interpreted as having a significance which has been the cause of embarrassment to members;

"*Therefore*, We desire, by this resolution, first, to express our thanks for the liberality of our friends in the past; and, secondly, to make the request in this public way that in the future there shall be no more expenditure of money for the public entertainment of members of this Association.

The preamble and resolution were unanimously adopted.



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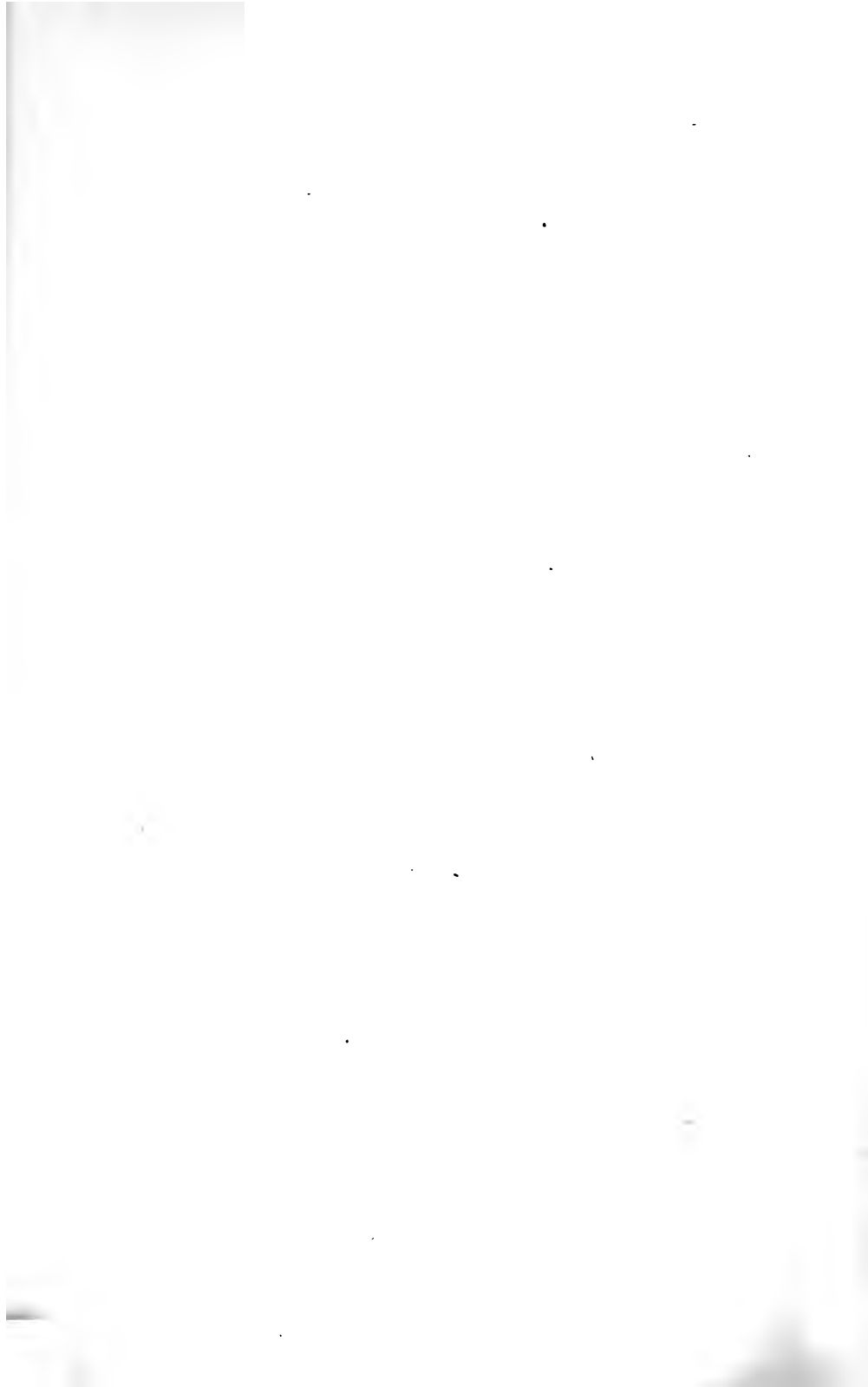
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**M. C. B.—1.**

Standard Journal Box and Contained Parts.

For Journal  $3\frac{3}{4}$  by 7 inches.

For Freight Cars.



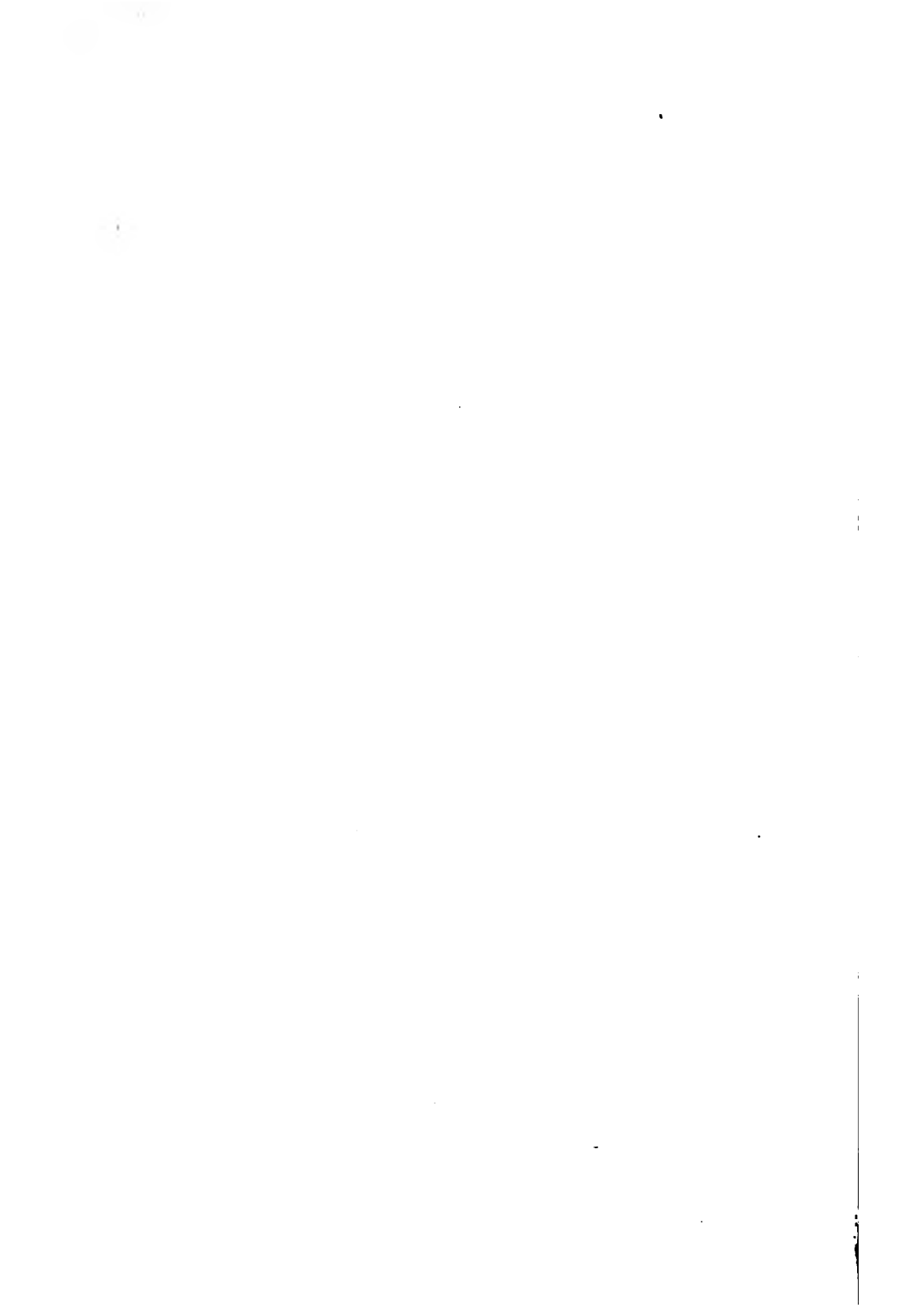
**M. C. B.—2.**

Standard Journal Box.  
For Journal  $3\frac{3}{4}$  by 7 inches.  
For Freight Cars.



**M. C. B.—3.**

Standard Bearing, Wedge and Lid.  
For Journal  $3\frac{3}{4}$  by 7 inches.



**M. C. B.—4.**

Standard Journal Box and Contained Parts.  
For Journal  $4\frac{1}{4}$  by 8 inches.  
For Freight Cars.



**M. C. B.—5.**

**Standard Journal Box.  
For Journal  $4\frac{1}{4}$  by 8 inches.  
For Freight Cars.**



**M. C. B.—6.**

Standard Bearing, Wedge and Lid.  
For Journal  $4\frac{1}{4}$  by 8 inches.



**M. C. B.—7.**

**Standard Journal Box and Contained Parts.**

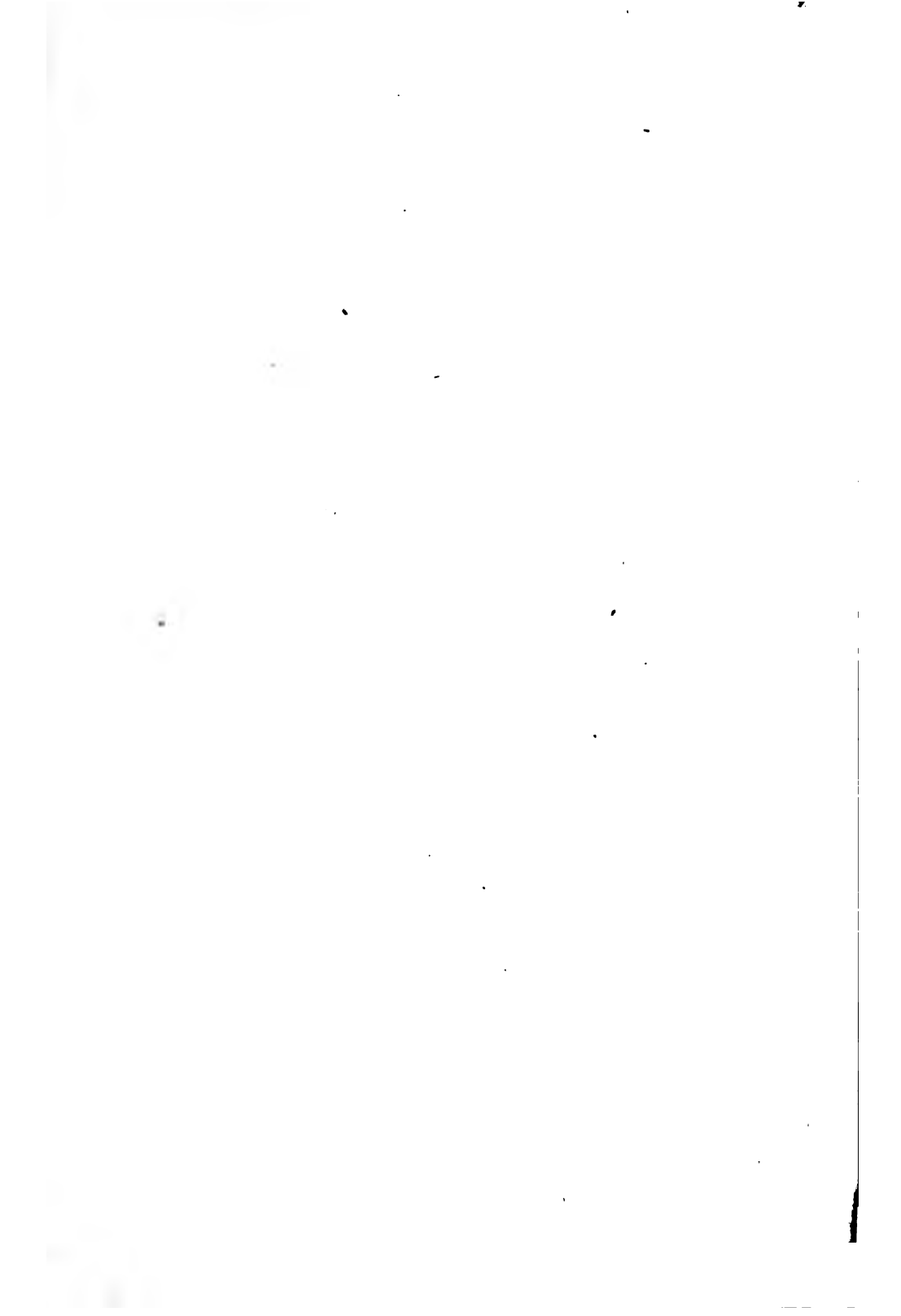
**For Journal 5 by 9 inches.**

**For Freight Cars.**



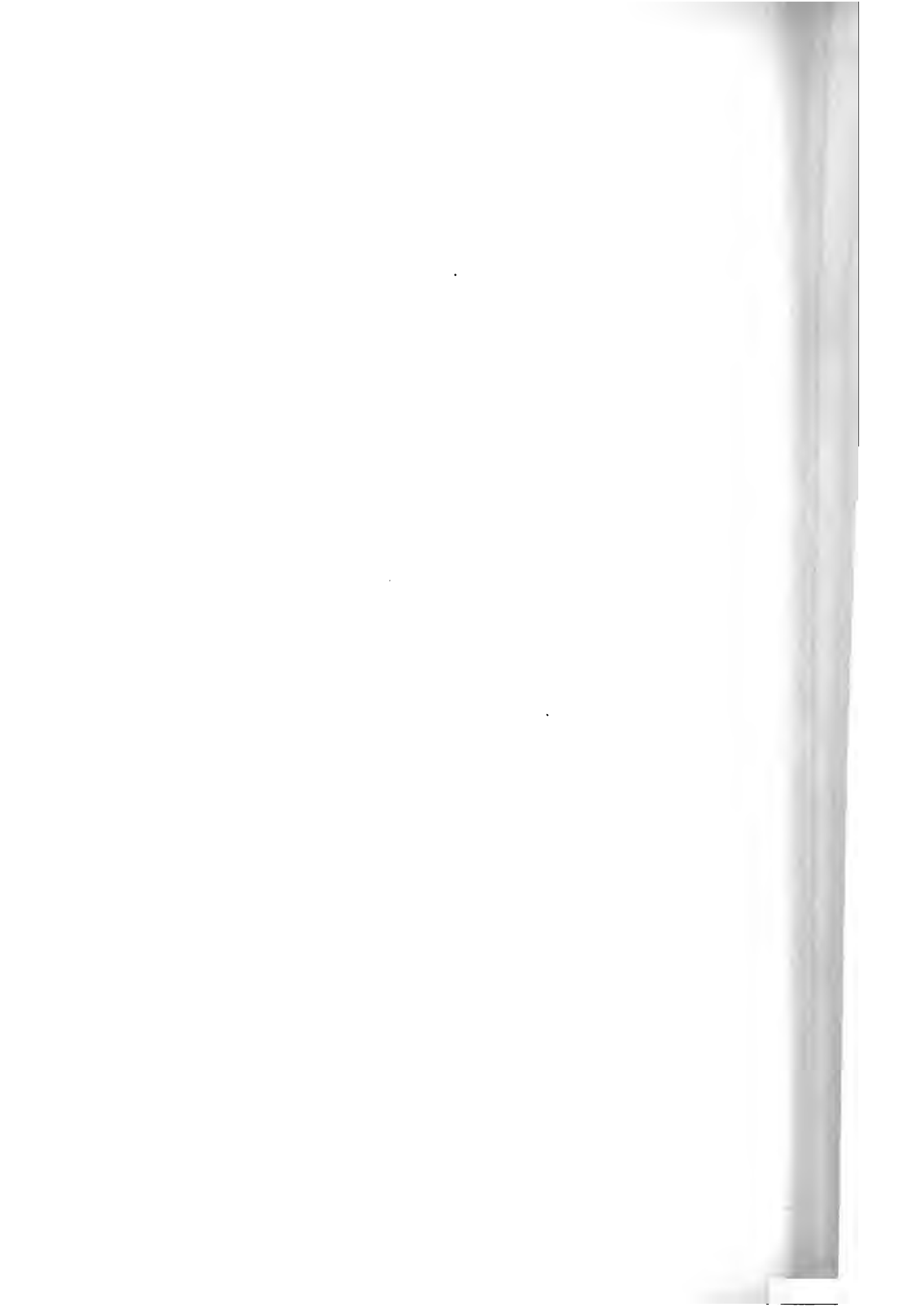
**M. C. B.—8.**

Standard Journal Box.  
For Journal 5 by 9 inches.  
For Freight Cars.



**M. C. B.—8 A.**

Standard Journal Box for Passenger Cars.  
Journal 5 by 9 inches.



**M. C. B.—9.**

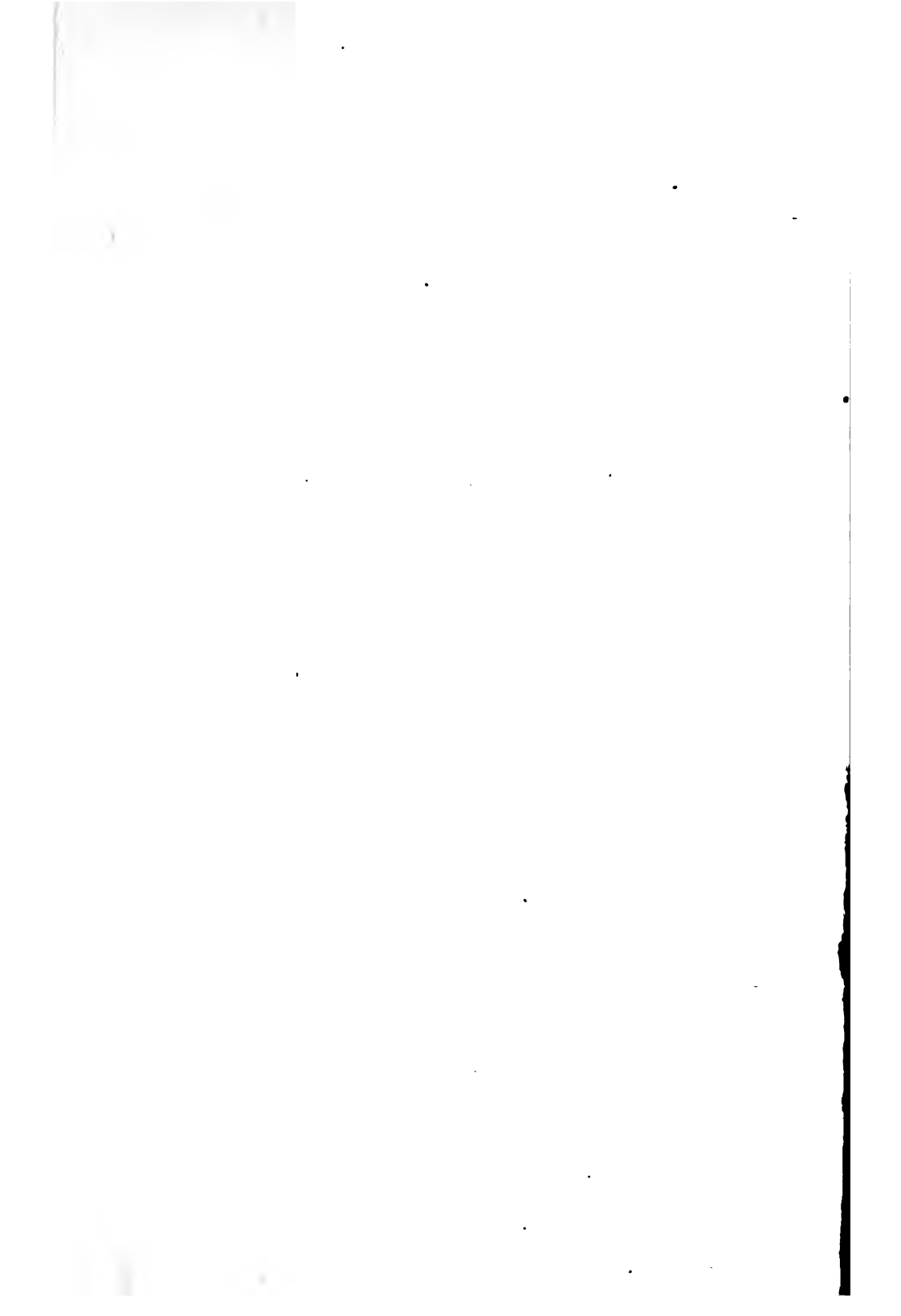
Standard Bearing, Wedge and Lid.  
For Journal 5 by 9 inches.

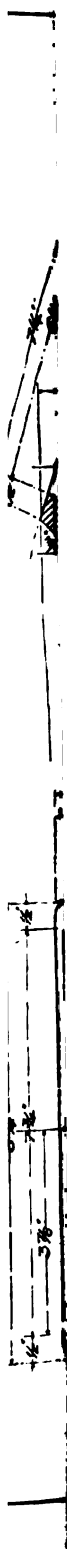




**M. C. B.—10.**

Journal Box and Contained Parts.  
For Journal  $5\frac{1}{2}$  by 10 inches.  
For Freight Cars.





**M. C. B.—11.**

Standard Journal Box.  
For Journal  $5\frac{1}{2}$  by 10 Inches.  
For Freight Cars.



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 HE DAME.  
 ME LID M  
 ESURED  
 V. B. THA  
 S 5x9  
 PROCELA



# **M. C. B.—12.**

Journal Bearing, Wedge and Lid.  
 For Journal  $5\frac{1}{2}$  by 10 inches.

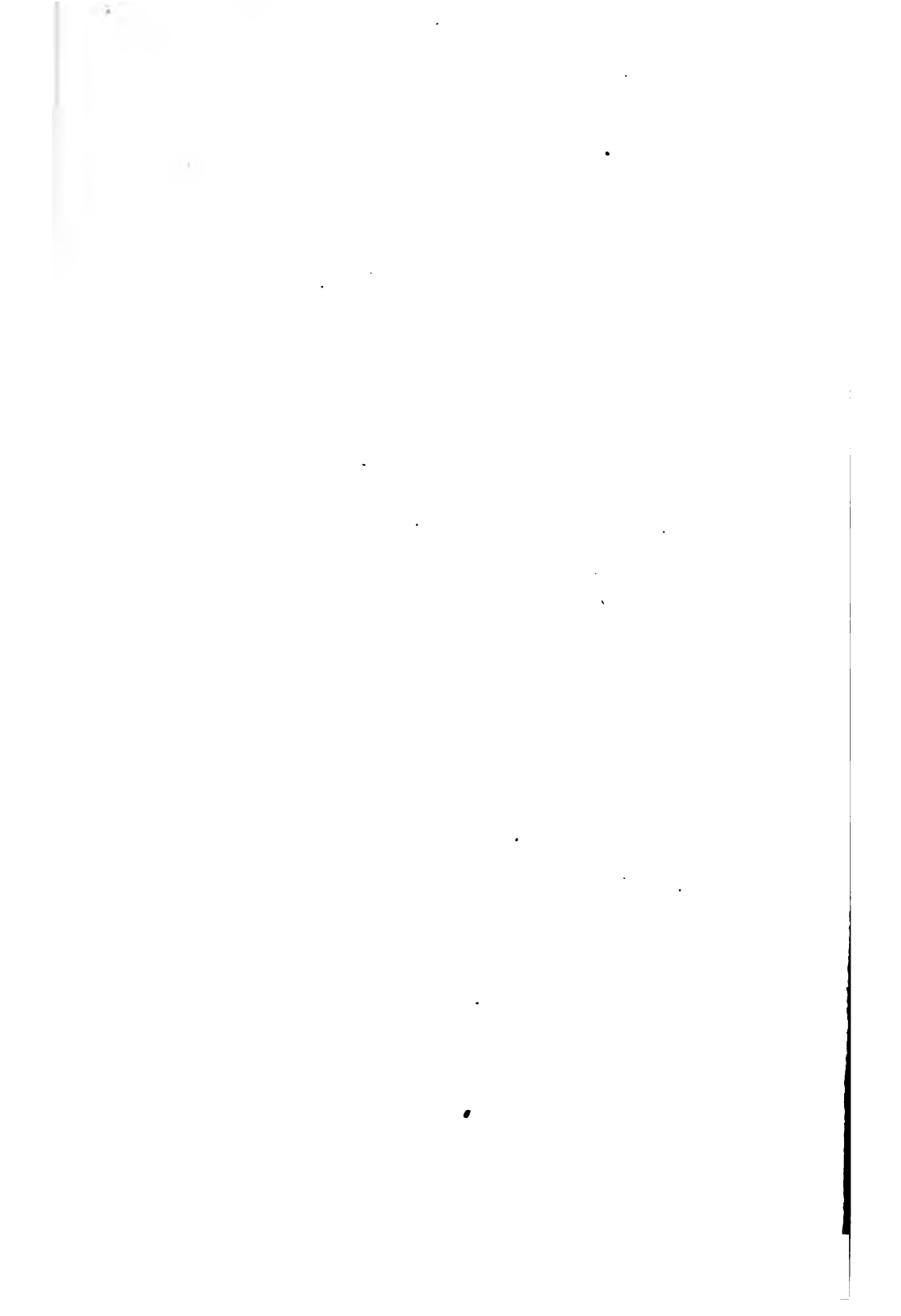


**M. C. B.—13.**

**Standard Journal Box and Contained Parts.**

**For Journal  $4\frac{1}{4}$  by 8 inches.**

**For Passenger Cars.**





### M. C. B.—14.

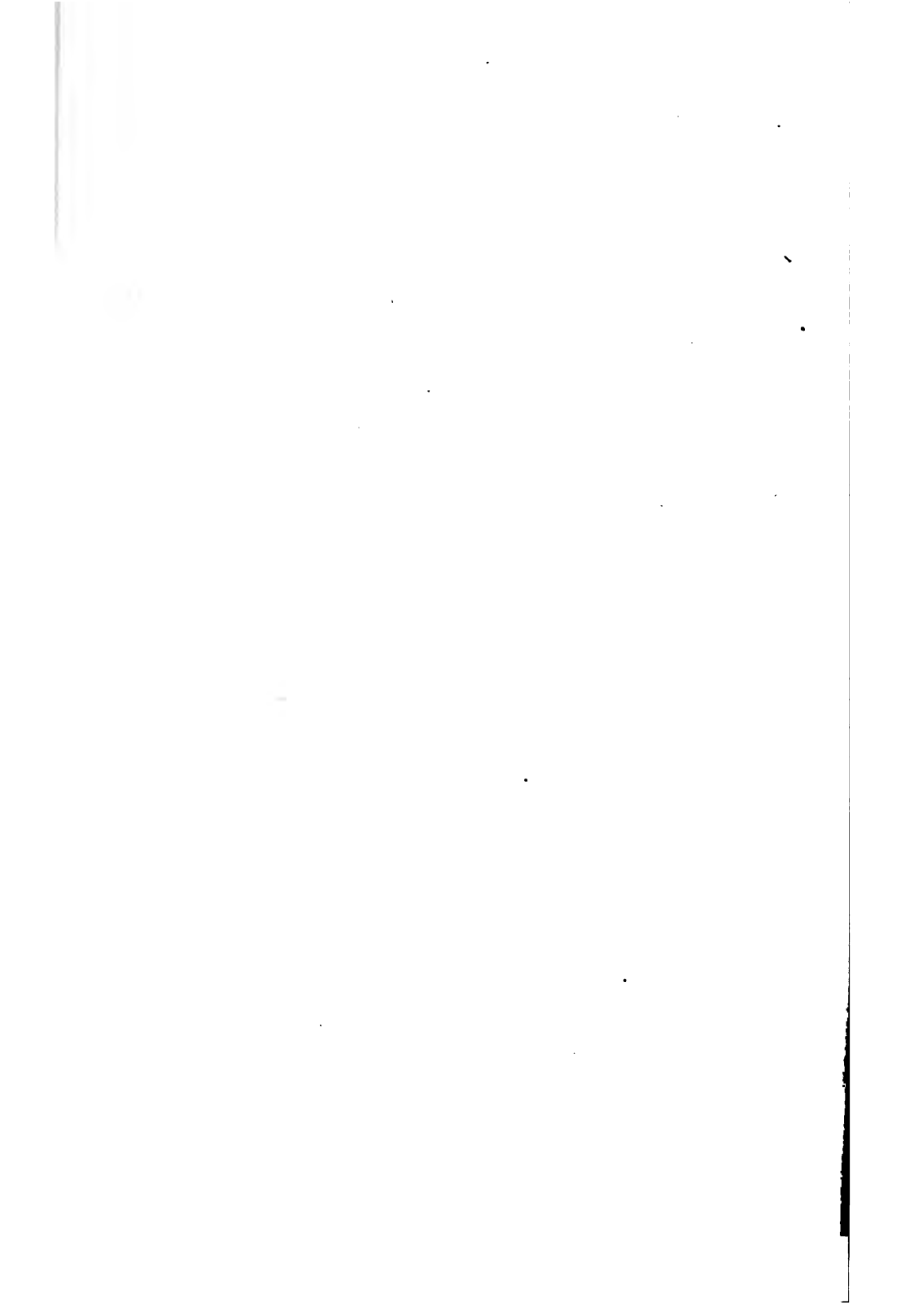
Journal Bearing and Wedge Gauges.

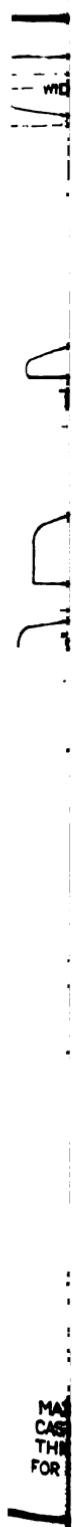
For Journals  $3\frac{3}{4}$  by 7 inches,  $4\frac{1}{4}$  by 8 inches,  
5 by 9 inches and  $5\frac{1}{2}$  by 10 inches.



**M. C. B.—15.**

Standard Axles.  
Standard Dust Guards.





**M. C. B.—16.**

Standard Terms and Gauging Points for  
Wheels and Track.

Standard Guard Rail and Frog Wing Gauge.

Standard Wheel Mounting and Check Gauge.

Standard Wheel Defect and Worn Coupler  
Limit Gauge.

Standard Wheel Tread and Flange.

Standard Flange Thickness Gauges for Cast-  
iron Wheels and Flange Thickness, Height

and Throat Radius Gauges for Solid

Steel and Steel Tired Wheels.





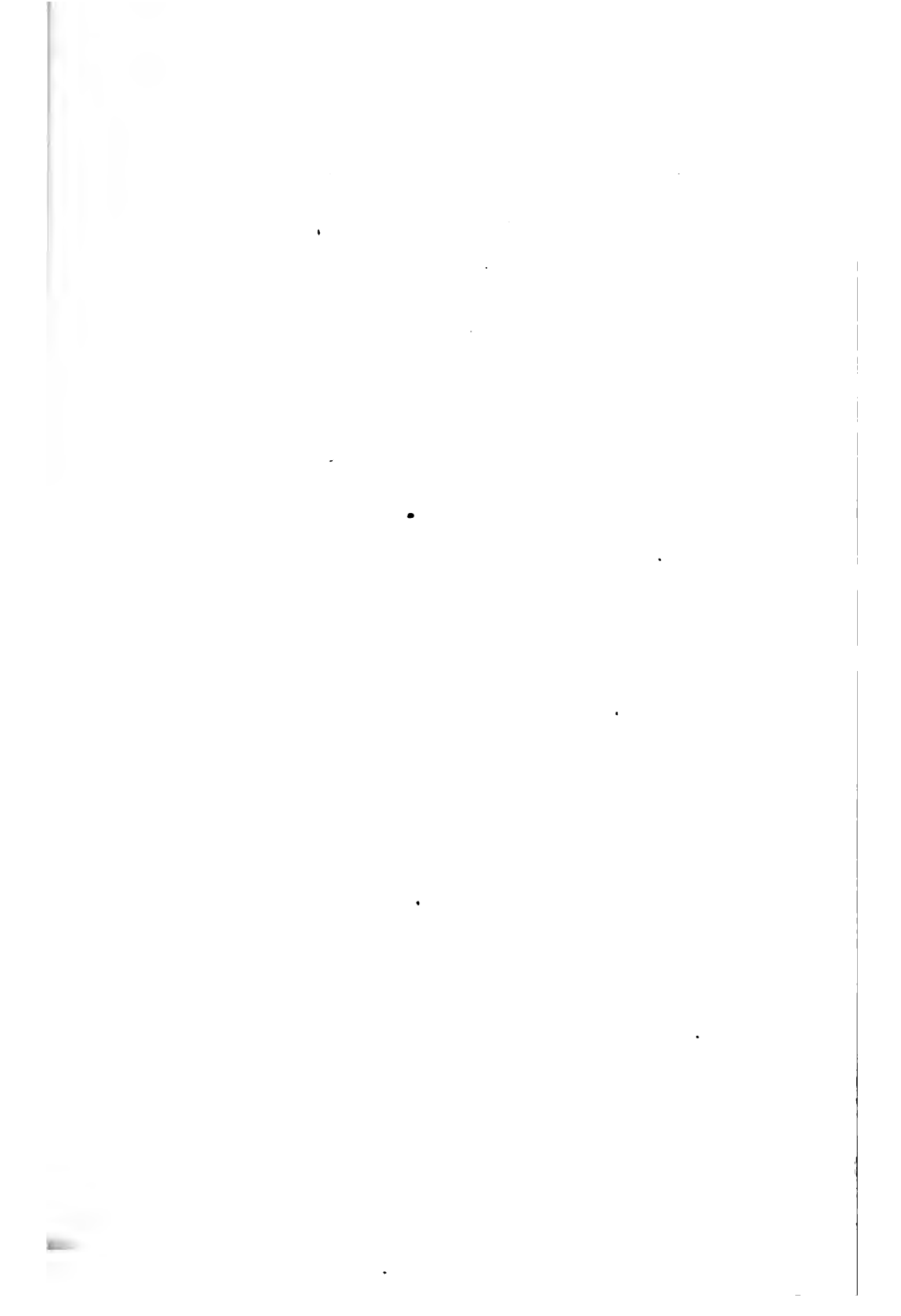
TEMPERED  
STEEL

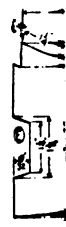
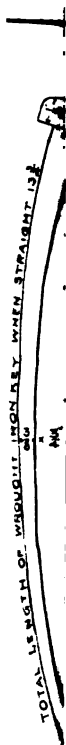


### **M. C. B.—16 A.**

Standard Limit Gauge for Remounting Cast-iron Wheels.

Standard Wheel Circumference Measure for Cast-iron Wheels.

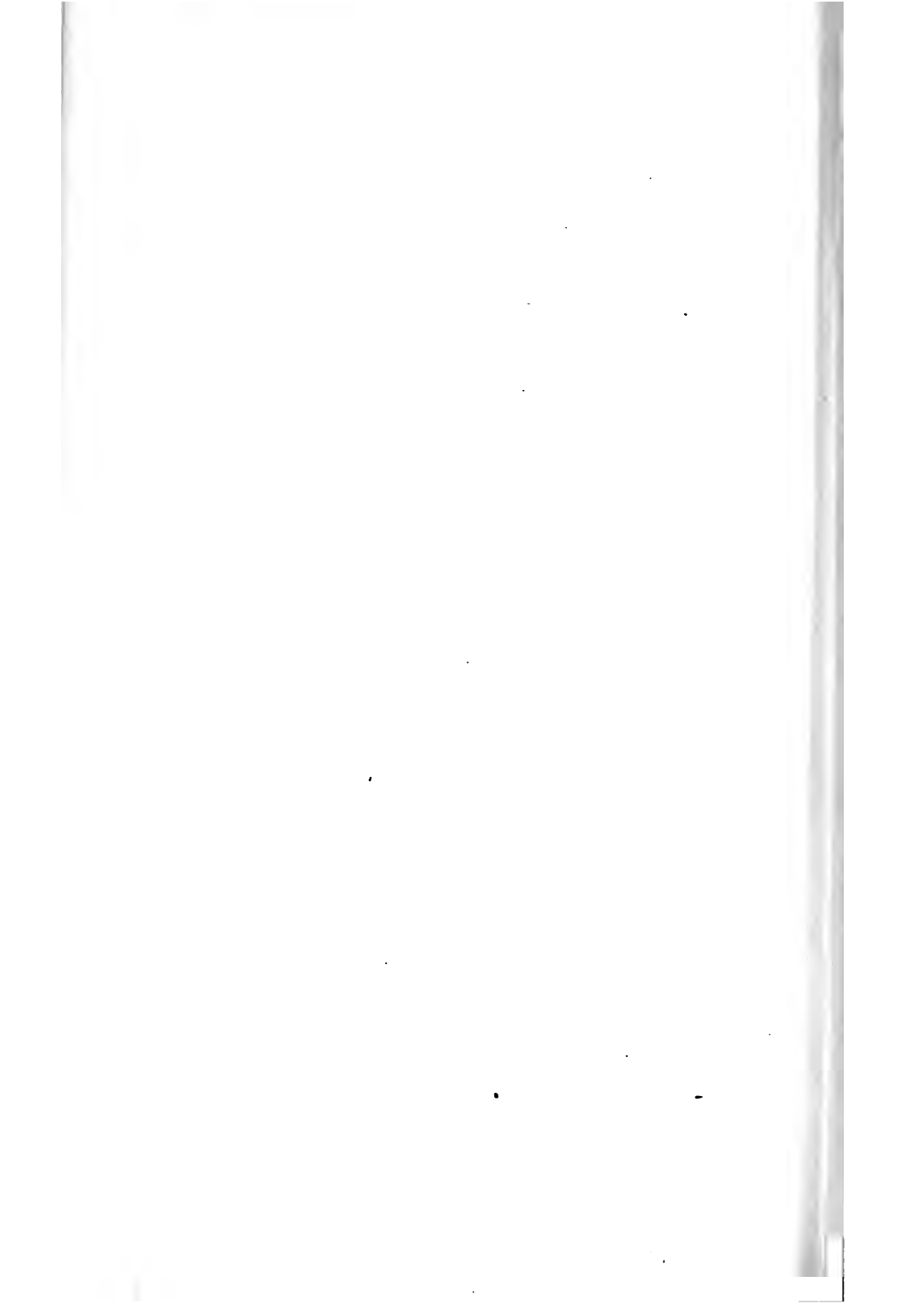




AA  
LINE  
LINE

# **M. C. B.—17.**

Standard Brake Head, Shoe and Key.  
Standard Gauges for Brake Head and Shoe.



### **M. C. B.—17 A.**

Standard Brake Beam.

Standard Brake Beam Gauge and Details.

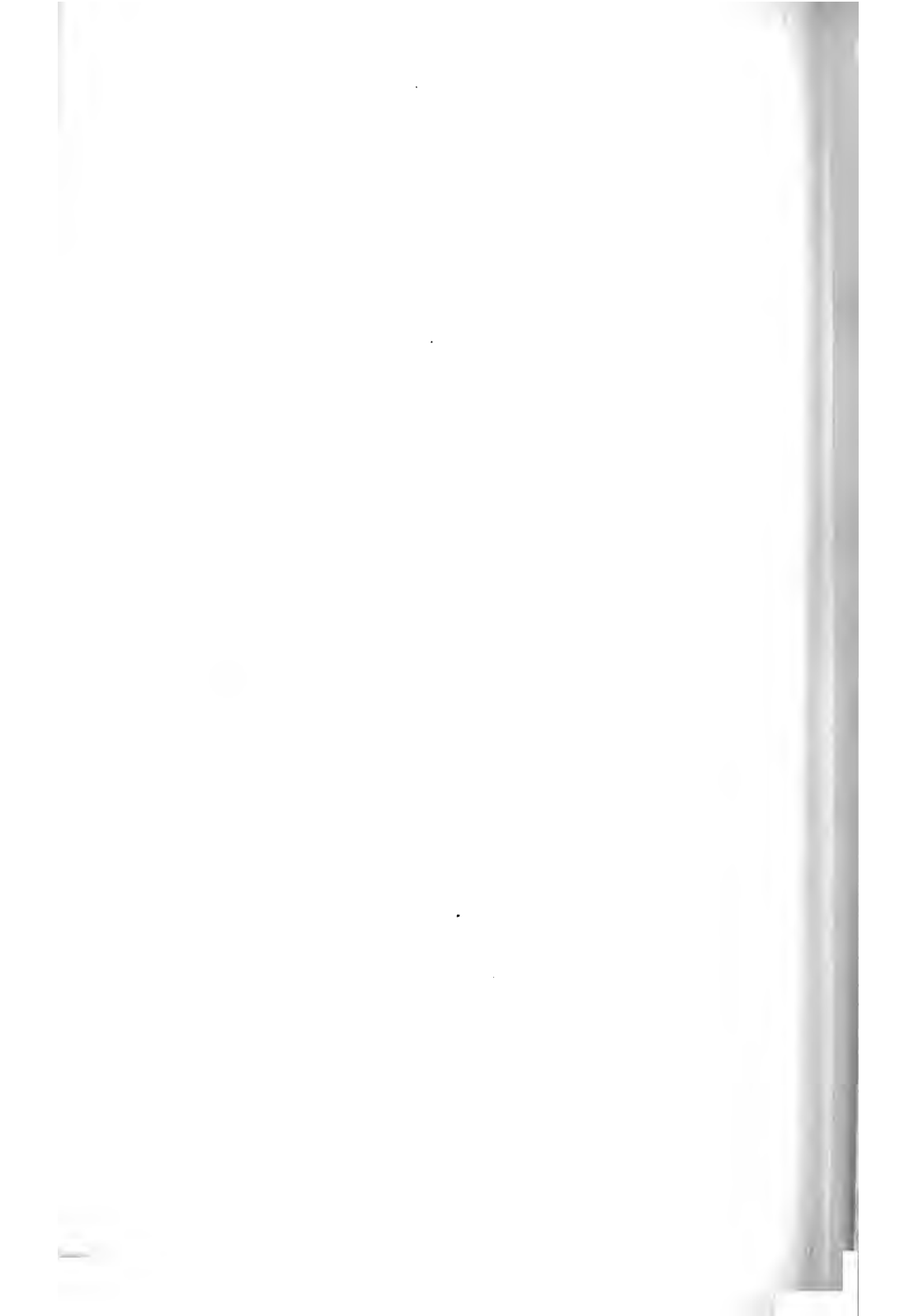
Standard Limiting Outline for Brake Beams.

Standard Lever Pin Hole Gauge.

Standard Master for Brake Beam Gauge.

Standard Limiting Contour for Gauge Head.

Standard Limiting Contour for Gauge Width.



**M. C. B.—18.**

Standards for Air Brakes on Freight Cars.

Standard Location of Main Air Pipe on  
Freight Cars.

Standard for Air Brake Hose.





**M. C. B.—18 A.**

Standard Label for Air Brake Hose.  
Standard Coupling and Packing Ring for Air  
Brake Hose.



**M. C. B.—19 A.**

Safety Appliances.

Any Efficient Arrangement of Ratchet Wheel  
and Pawl May Be Used.



**M. C. B.—19 B.**

Safety Appliances.  
Application to Outside End Sill Cars.



**M. C. B.—19 C.**

Safety Appliances.  
Box and Other House Cars.



**M. C. B.—19 D.**

Safety Appliances.  
Box and Other House Cars.  
(With Platform End Sills.)

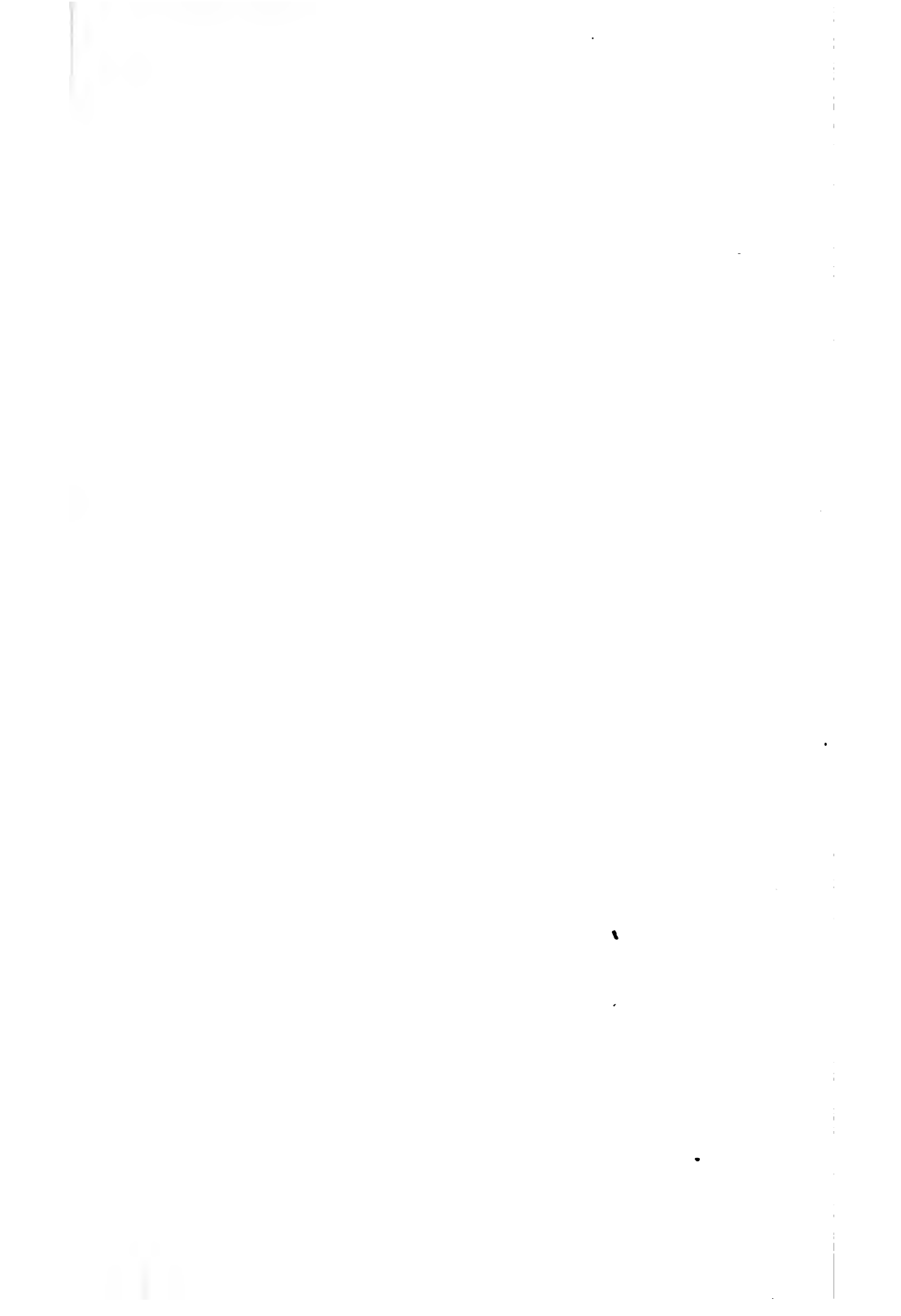


**M. C. B.—19 E.**

Safety Appliances.

Hopper Cars and High Side Gondolas with  
Fixed Ends.

(Cars with Sides More Than 36 Inches Above  
Floor.)



**M. C. B.—19 F.**

Safety Appliances.

Hopper Cars and High Side Gondolas with  
Fixed Ends.

(Cars with Sides More Than 36 Inches Above  
Floor.)

(With Platform End Sills.)



**M. C. B.—19 G.**

Safety Appliances.

Drop End High Side Gondola Cars.

(Cars with Sides More Than 36 Inches Above  
Floor.)



**M. C. B.—19 H.**

Safety Appliances.

Drop End High Side Gondola Cars.

(Cars with Sides More Than 36 Inches Above  
Floor.)

(With Platform End Sills.)



**M. C. B.—19 I.**

Safety Appliances.

Fixed End Low Side Gondola and Low Side  
Hopper Cars.

(Cars with Sides 36 Inches or Less Above  
Floor.)



**M. C. B.—19 J.**

Safety Appliances.

Fixed End Low Side Gondola and Low Side  
Hopper Cars.

(Cars with Sides 36 Inches or Less Above  
Floor.)

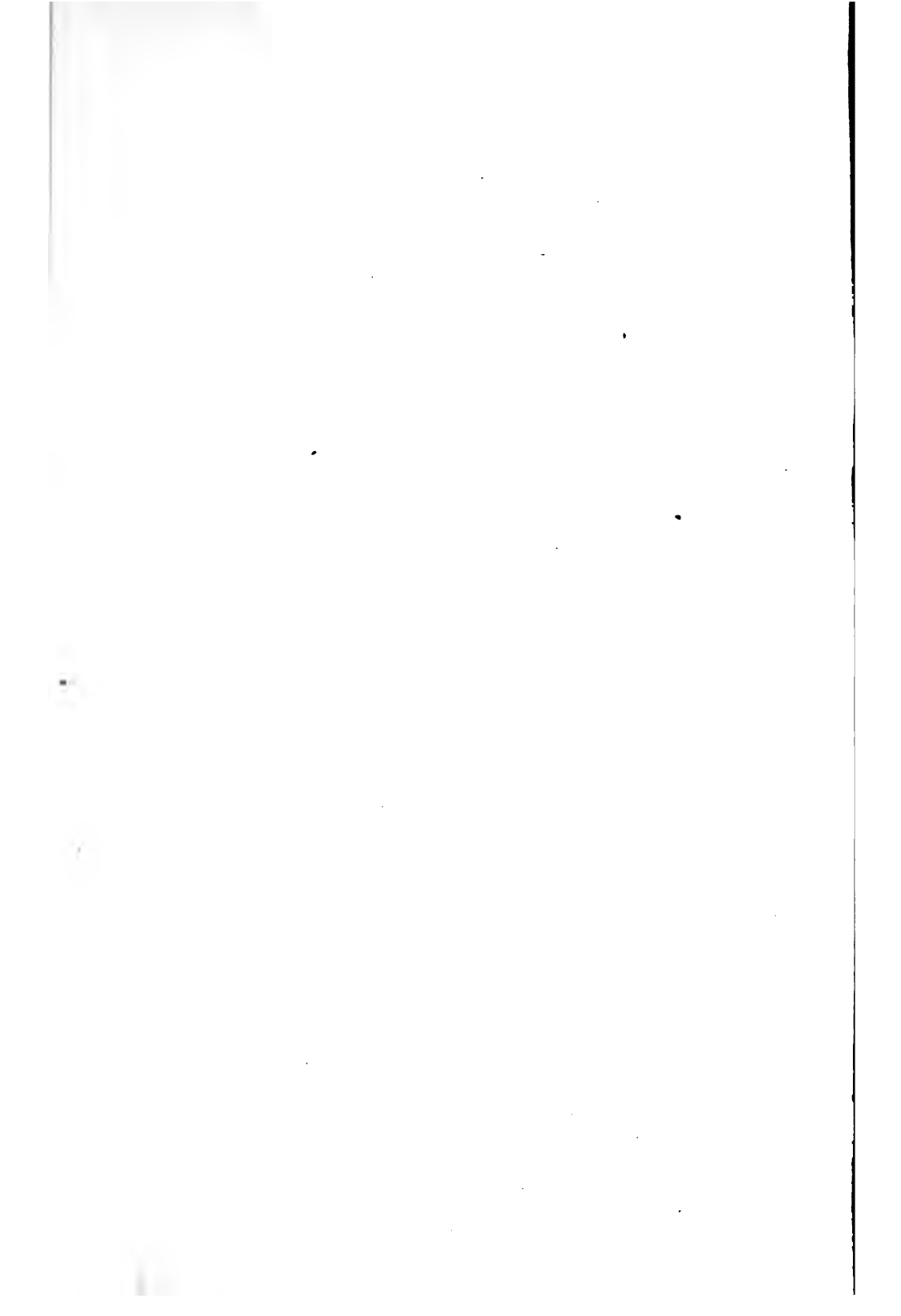
(With Platform End Sills.)



**M. C. B.—19 K.**

Safety Appliances.

Drop End Low Side Gondola Cars.  
(Cars with Sides 36 Inches or Less Above  
Floor.)

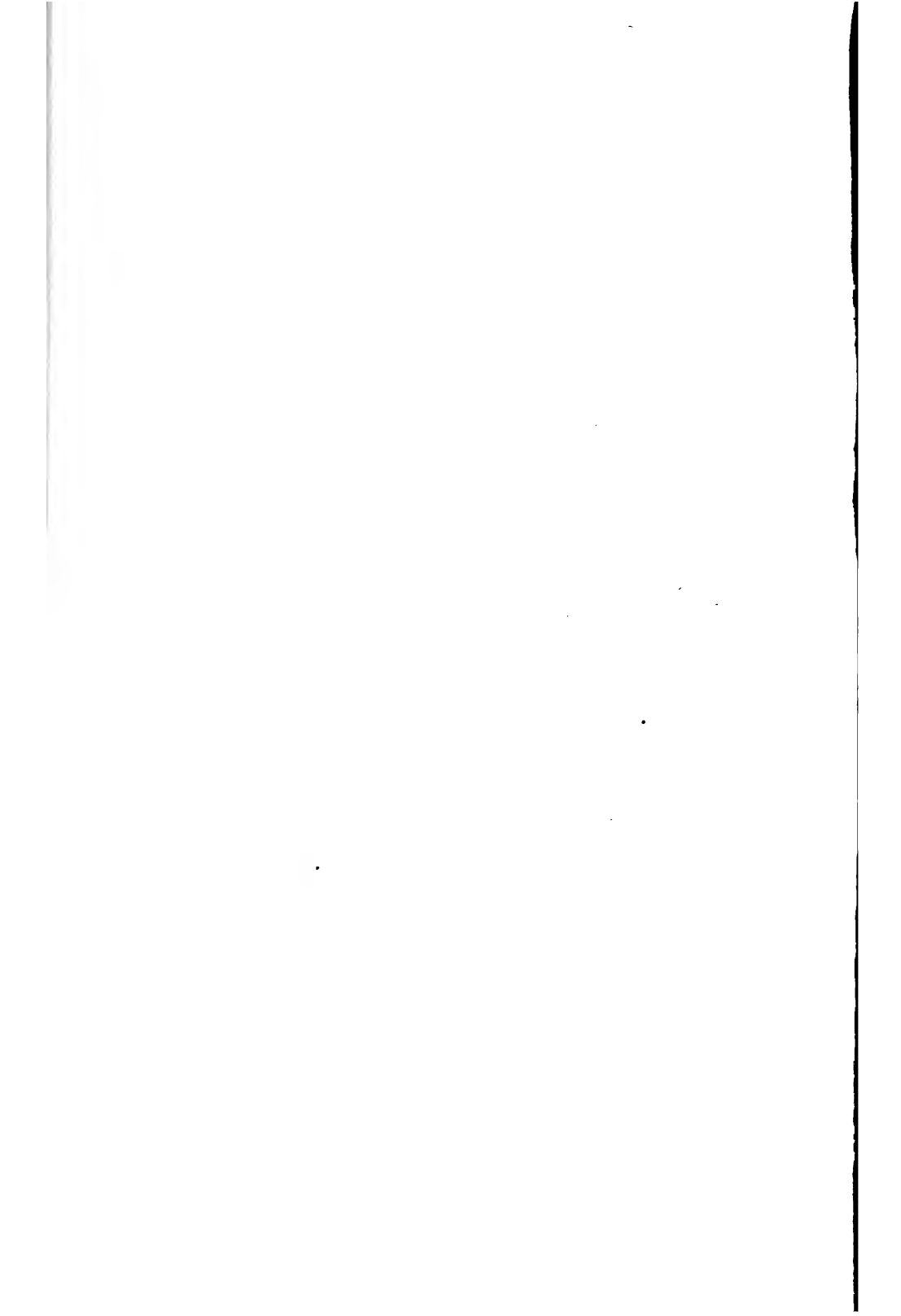


**M. C. B.—19 L.**

Safety Appliances.

Drop End Low Side Gondola Cars.  
(Cars with Sides 36 Inches or Less Above  
Floor.)

(With Platform End Sills.)



**M. C. B.—19 M.**

Safety Appliances.

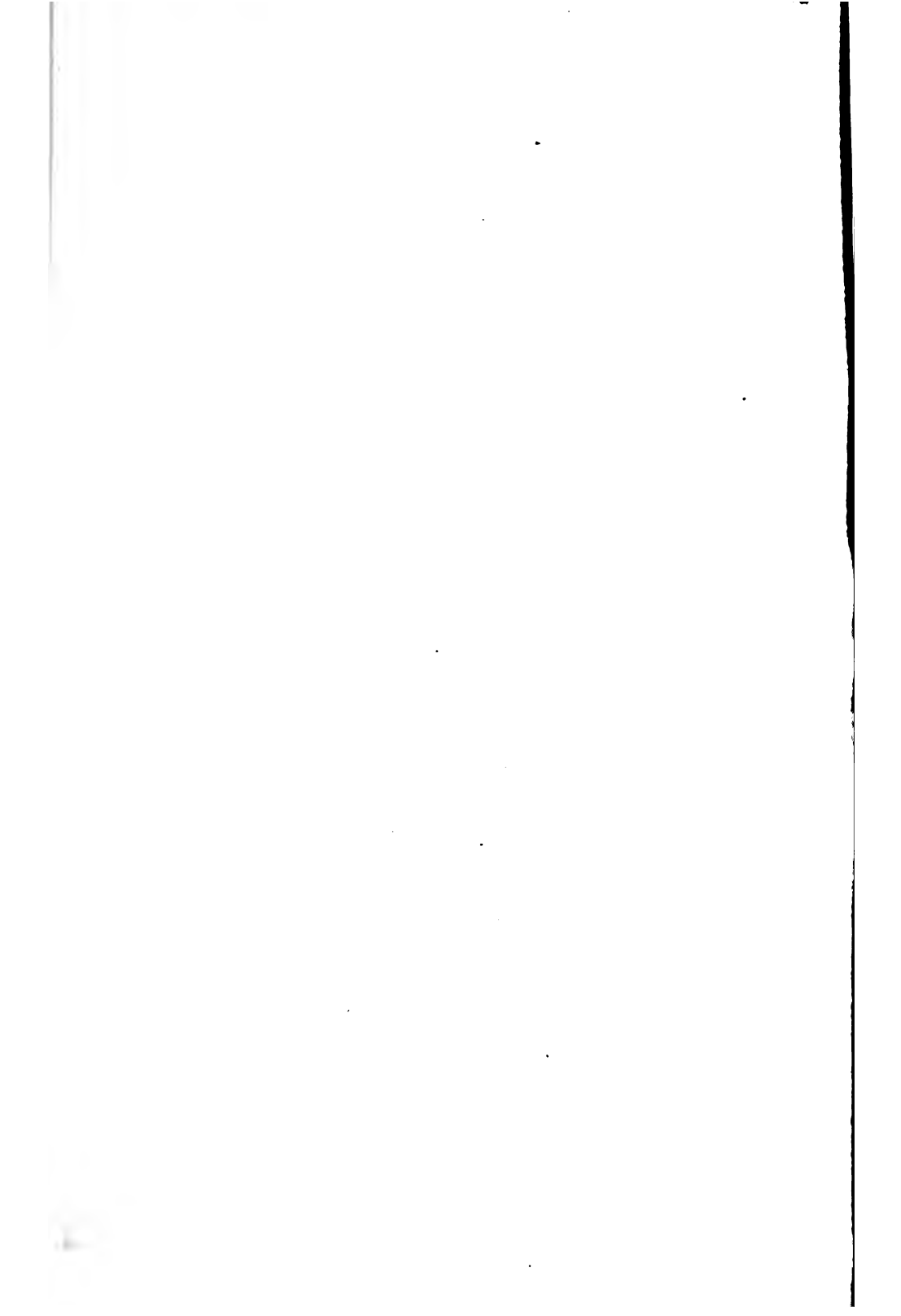
Flat Cars.

(Cars with Sides 12 Inches or Less Above  
Floor May Be Equipped Same  
as Flat Cars.)



**M. C. B.—19 N.**

Safety Appliances.  
Tank Cars with Side Platforms.



**M. C. B.—19 O.**

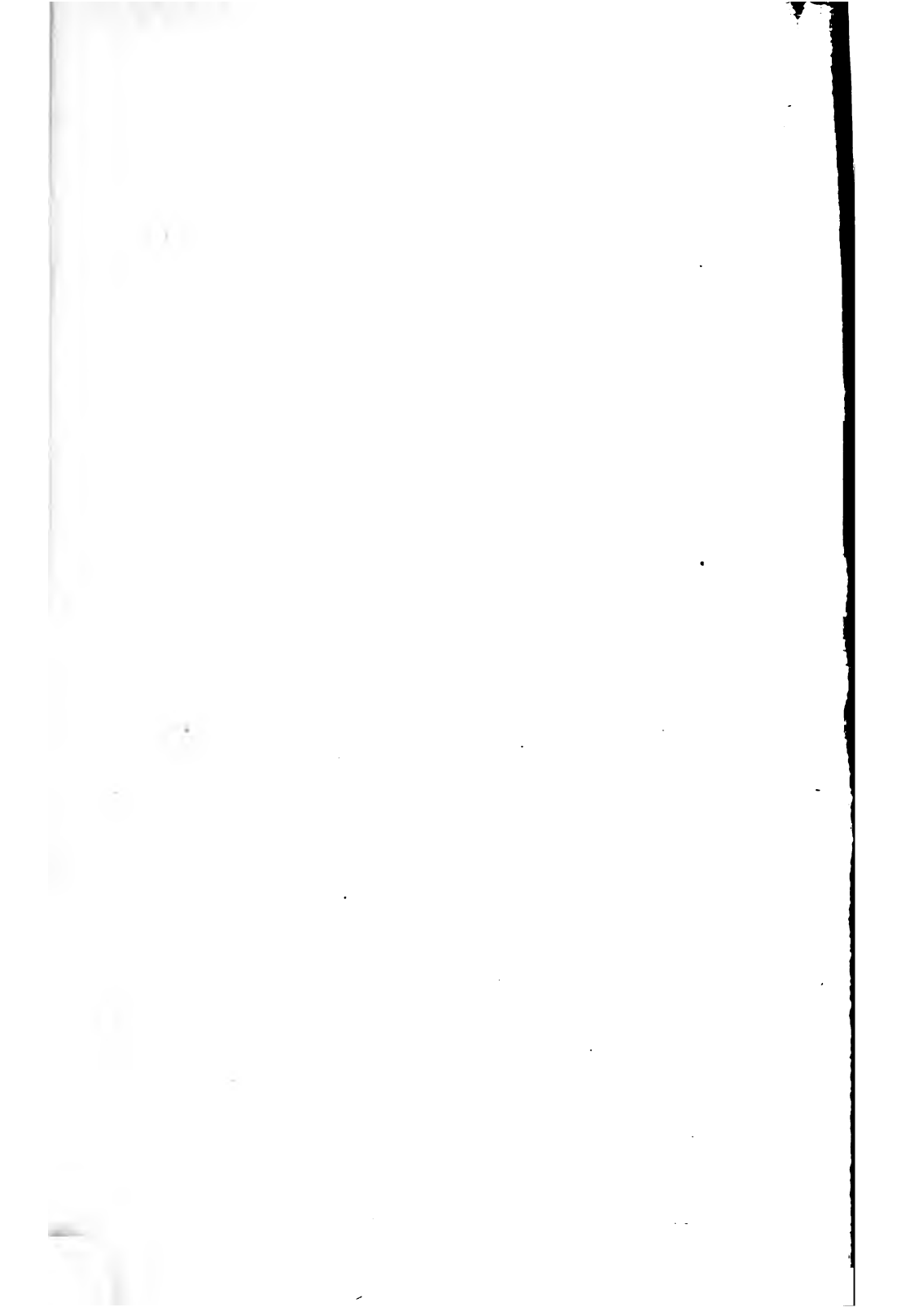
Safety Appliances.

Tank Cars without Side Sills and Tank Cars  
with Short Side Sills and End Platforms.



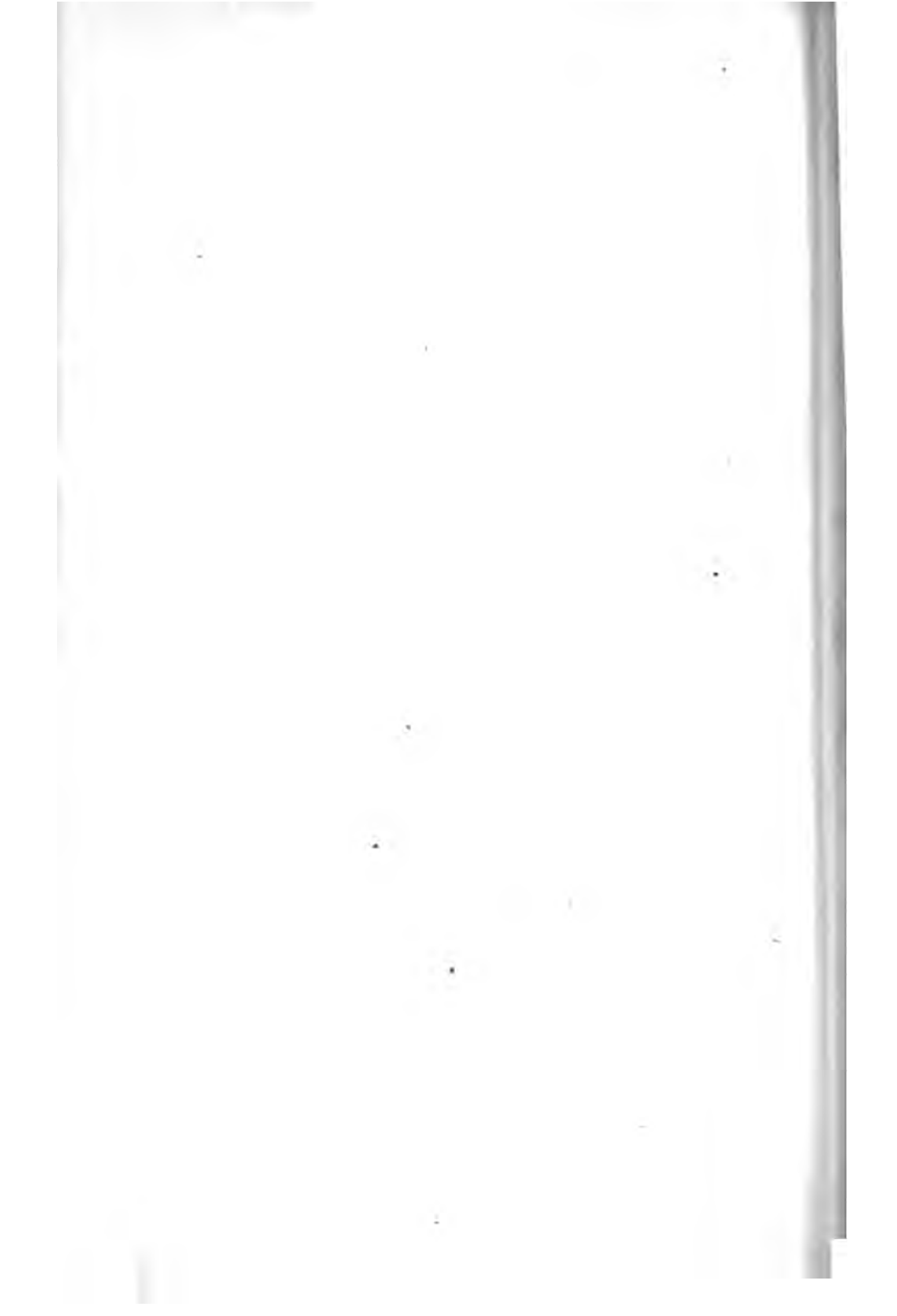
• **M. C. B.—19 P.**

Safety Appliances.  
Tank Cars without End Sills.



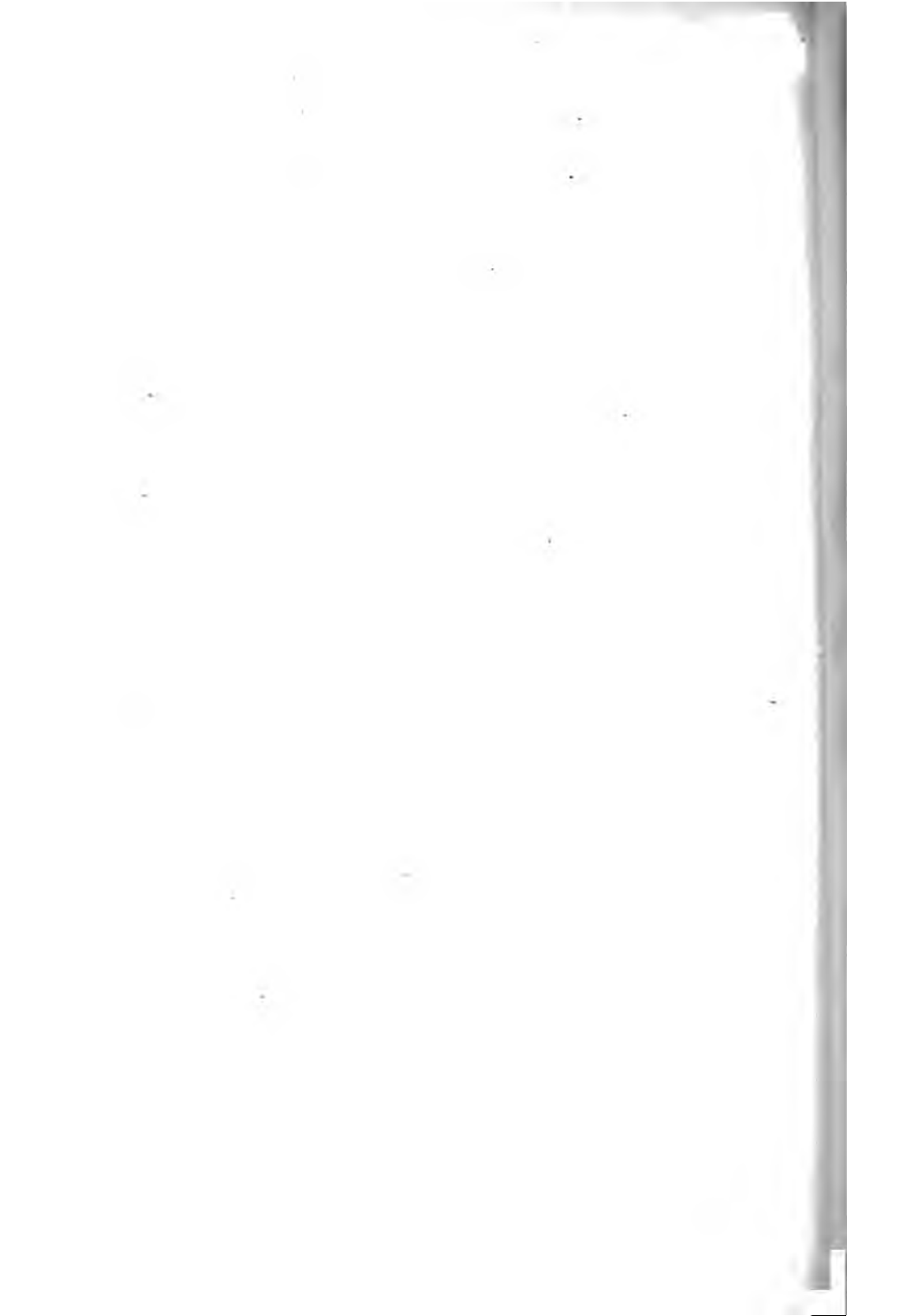
**M. C. B.—19 Q.**

Safety Appliances.  
Caboose Cars with Platforms.



**M. C. B.—19 R.**

Safety Appliances.  
Caboose Cars without Platforms.



**M. C. B.—20.**

Standard Arch Bars and Column and Journal Box Bolts for 80,000 Lbs. and 100,000 Lbs. Capacity Cars.  
Standard Center Plate.



**M. C. B.—21.**

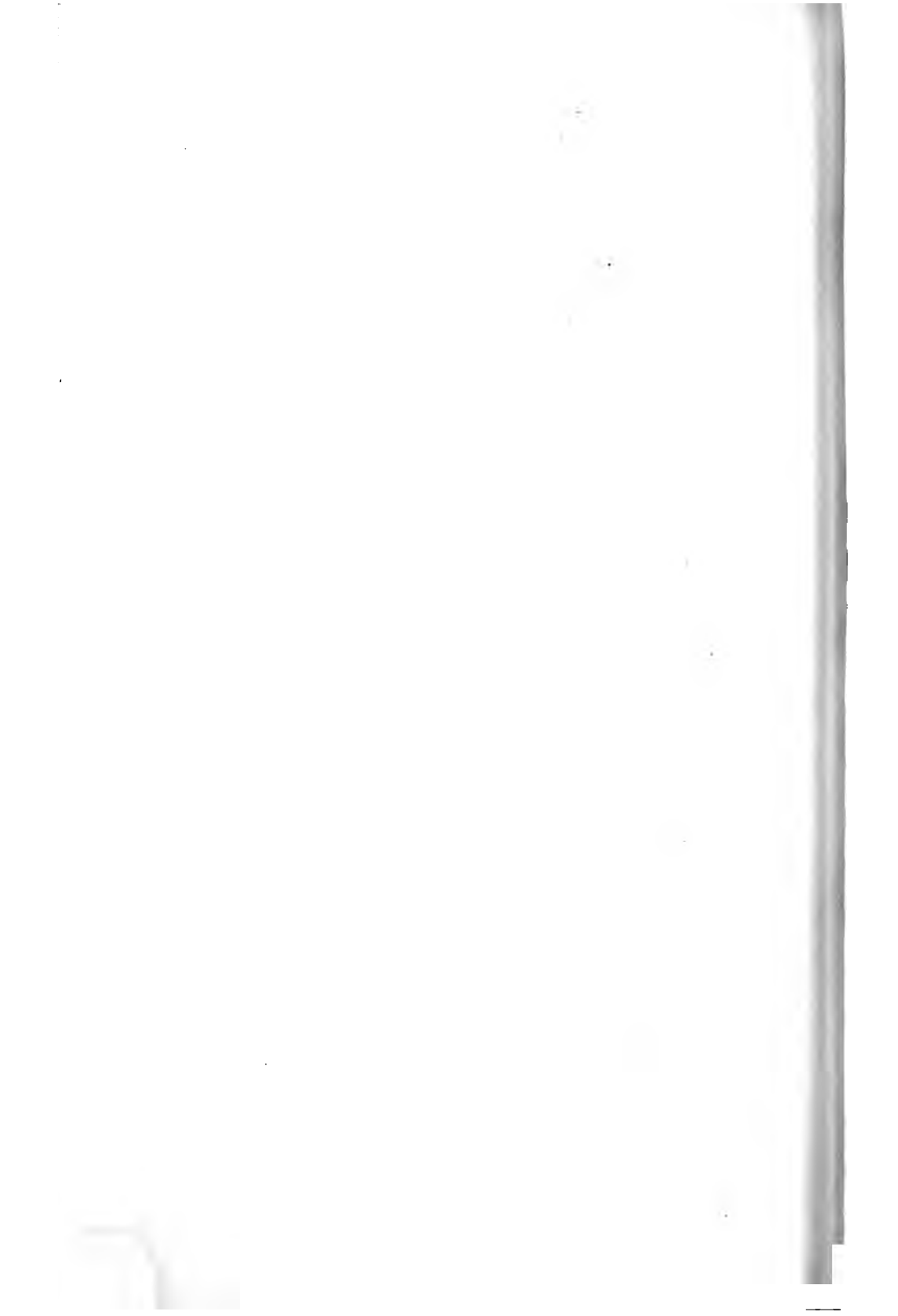
Standard Pedestal for Journals  $3\frac{3}{4}$  by 7  
Inches.



**M. C. B.—22.**

Standard Passenger Car Pedestal for Journal  
4¼ by 8 Inches.

Standard Passenger Car Pedestal for Journal  
5 by 9 Inches.



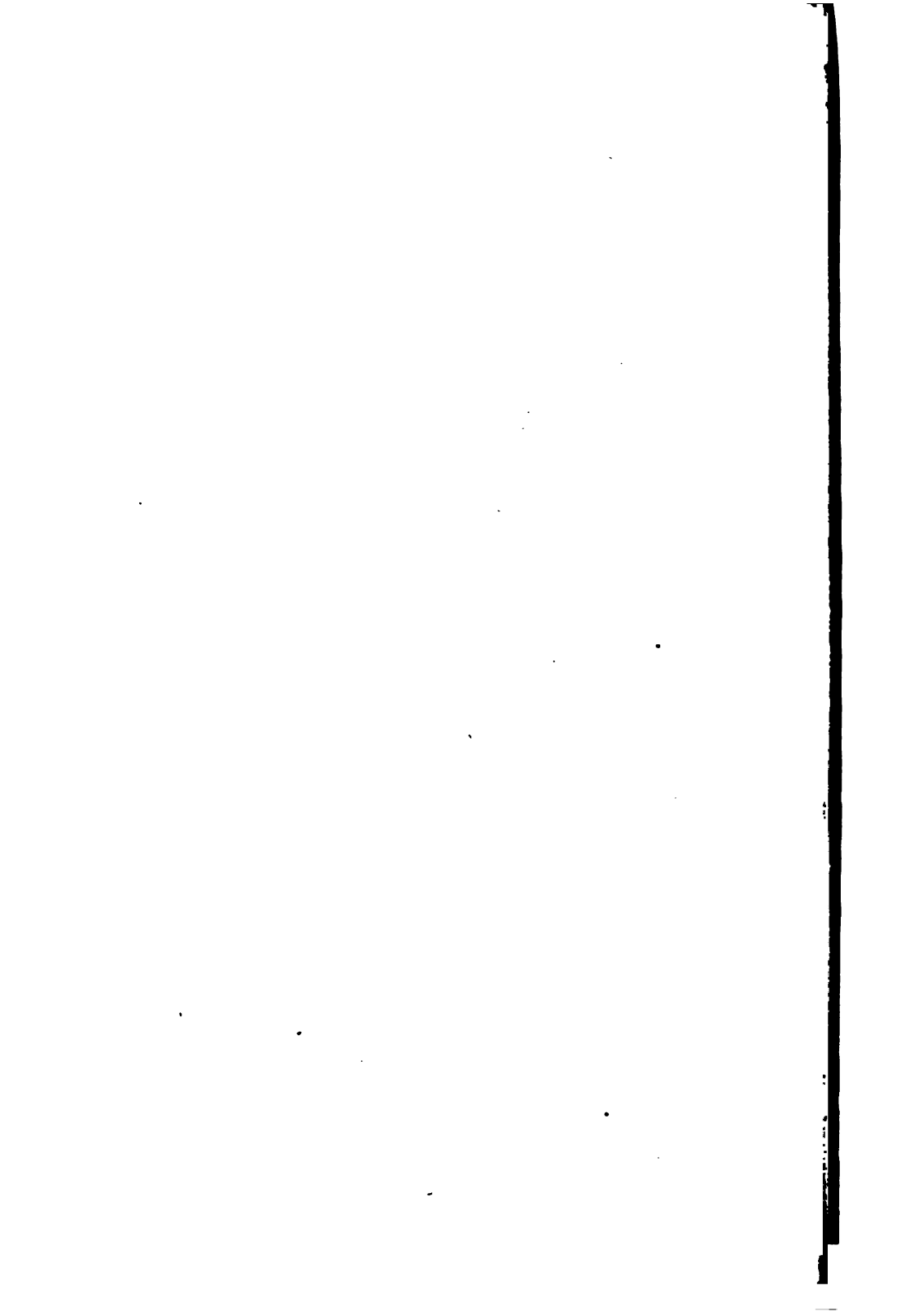
**M. C. B.—23.**

Standard Automatic Coupler.

Standard Contour Line.

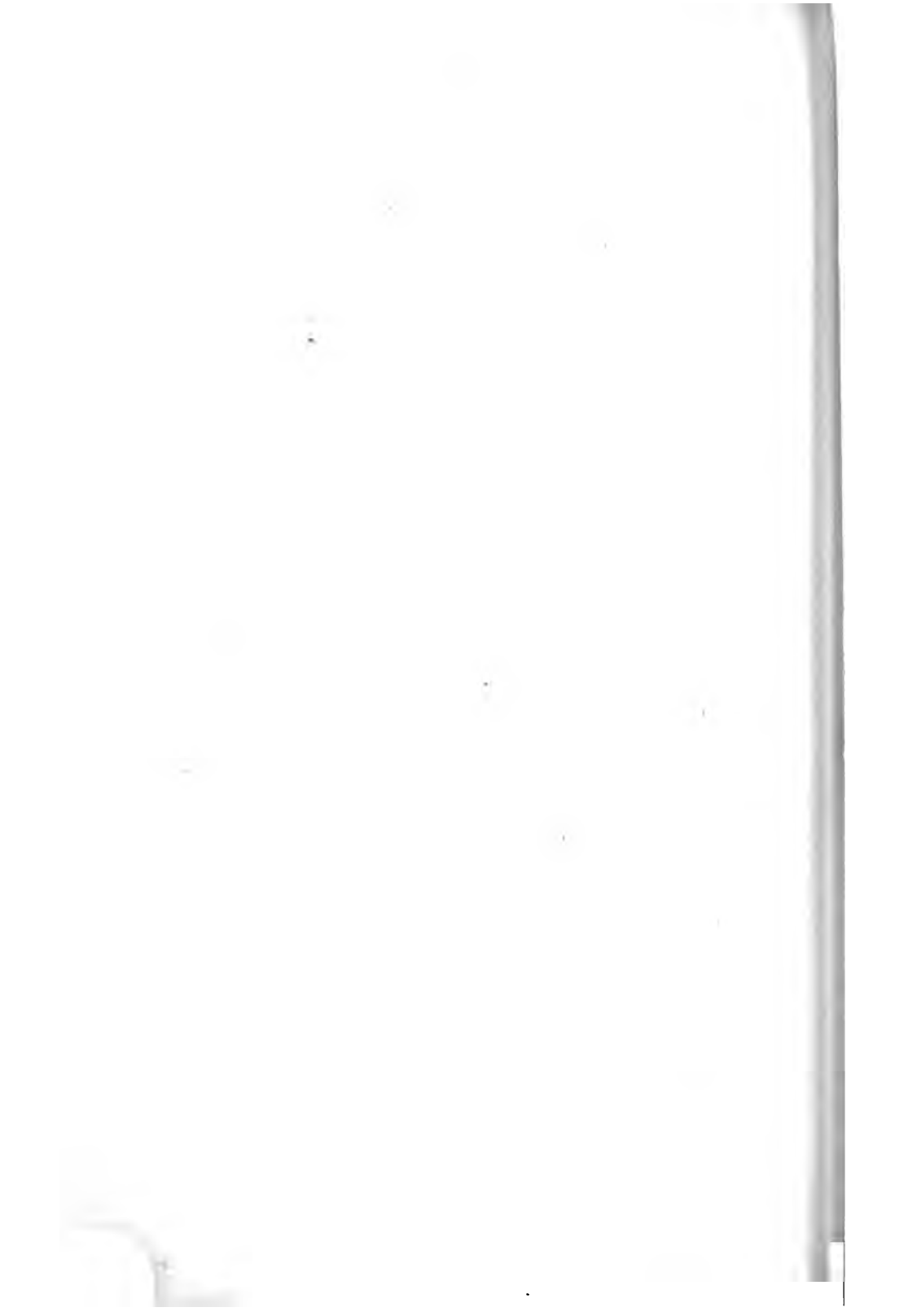
Standard Draft Gear Stops.

Standard Key Slot for 5 by 5 Inch and 5 by 7  
Inch Shanks.



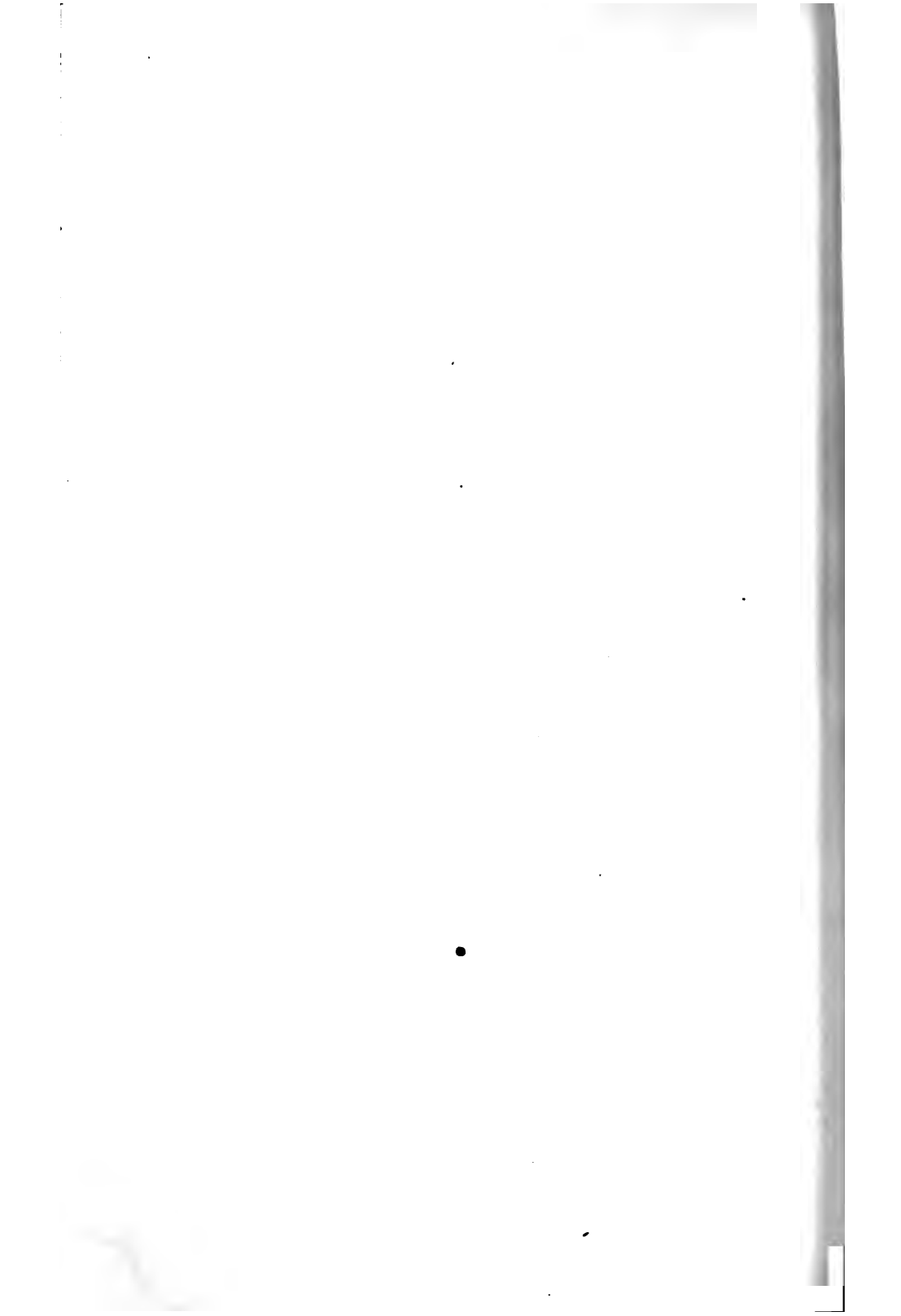
**M. C. B.—23 A.**

Standard Automatic Coupler Yoke.  
Standard Automatic Uncoupling Attachments.  
Standard Brake Chain.



**M. C. B.—24.**

Standard Inspectors' Gauges for Coupler  
Shank and Yoke.  
Standard Limit Gauges.



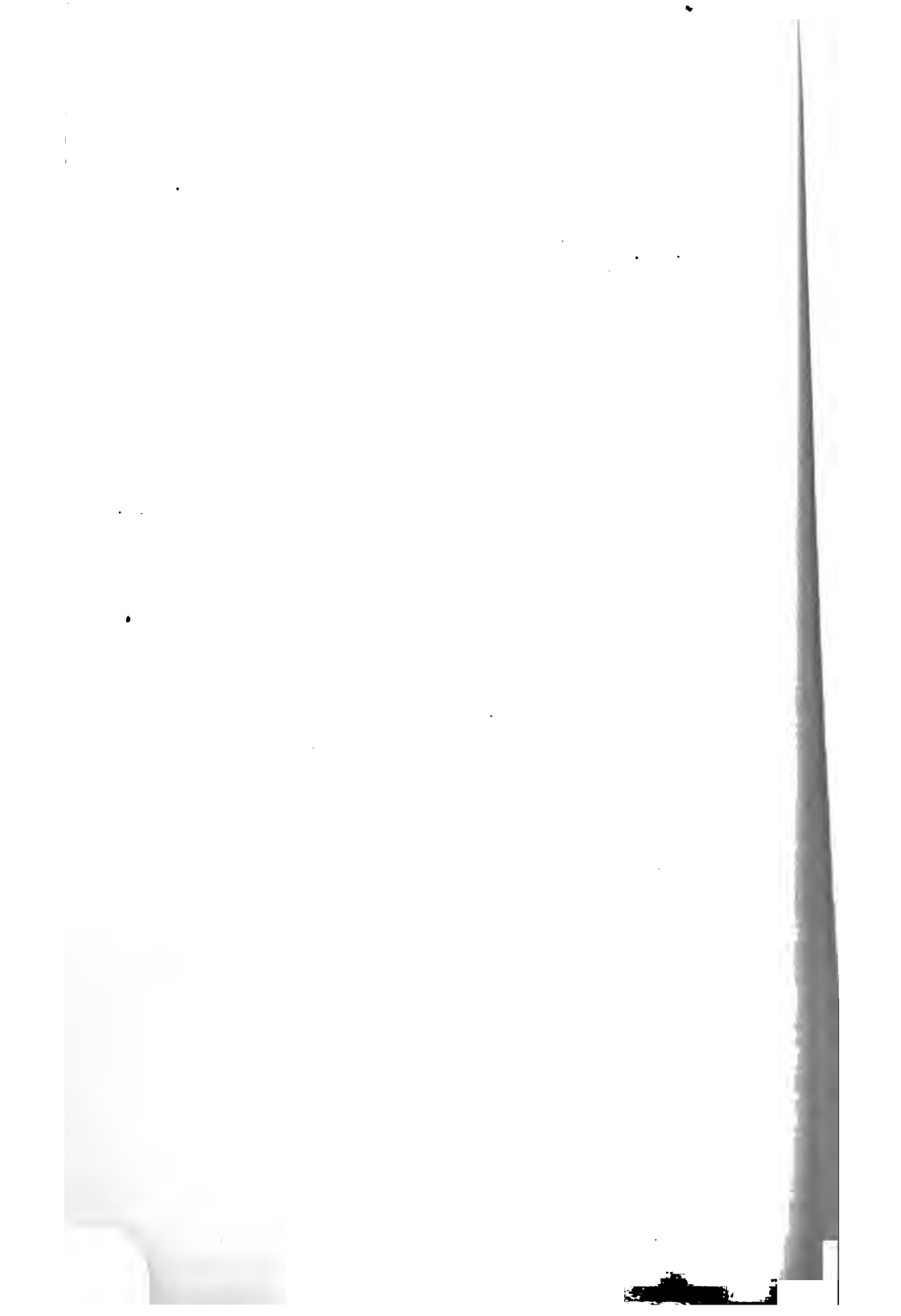
**M. C. B.—26.**

Standard Marking of Freight Cars.  
Standard Flooring, Rough and Finished.  
Standard Sheathing, Roofing and Lining.  
Standard Signal Lamp Socket.



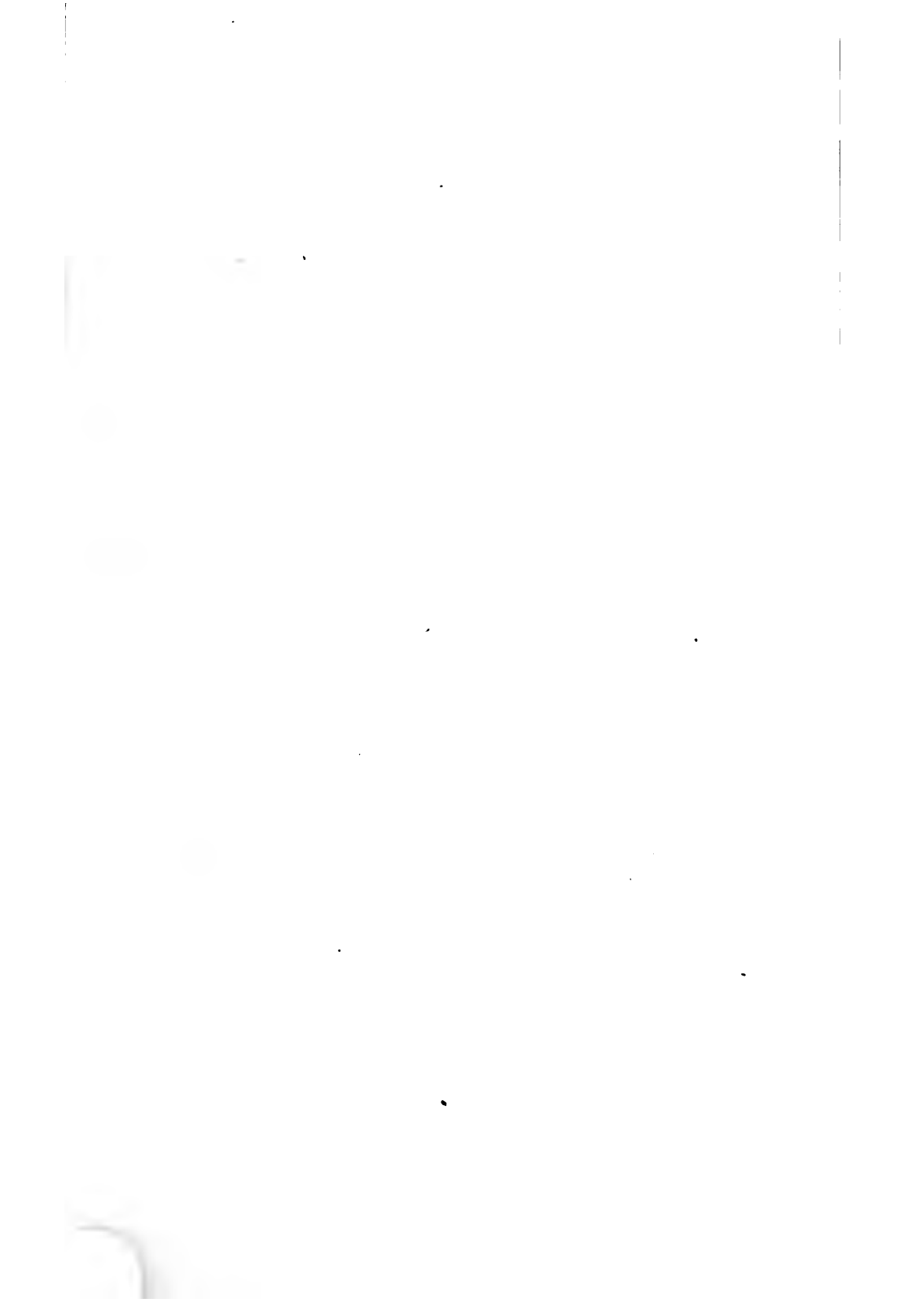
**M. C. B.—26 A.**

Standard Marking of Freight Cars.



**M. C. B.—27.**

**Standard Lettering for Freight Cars.**



**M. C. B.—28.**

Standard Splicing of Steel Sills.  
Standard Splicing of Wooden Sills.

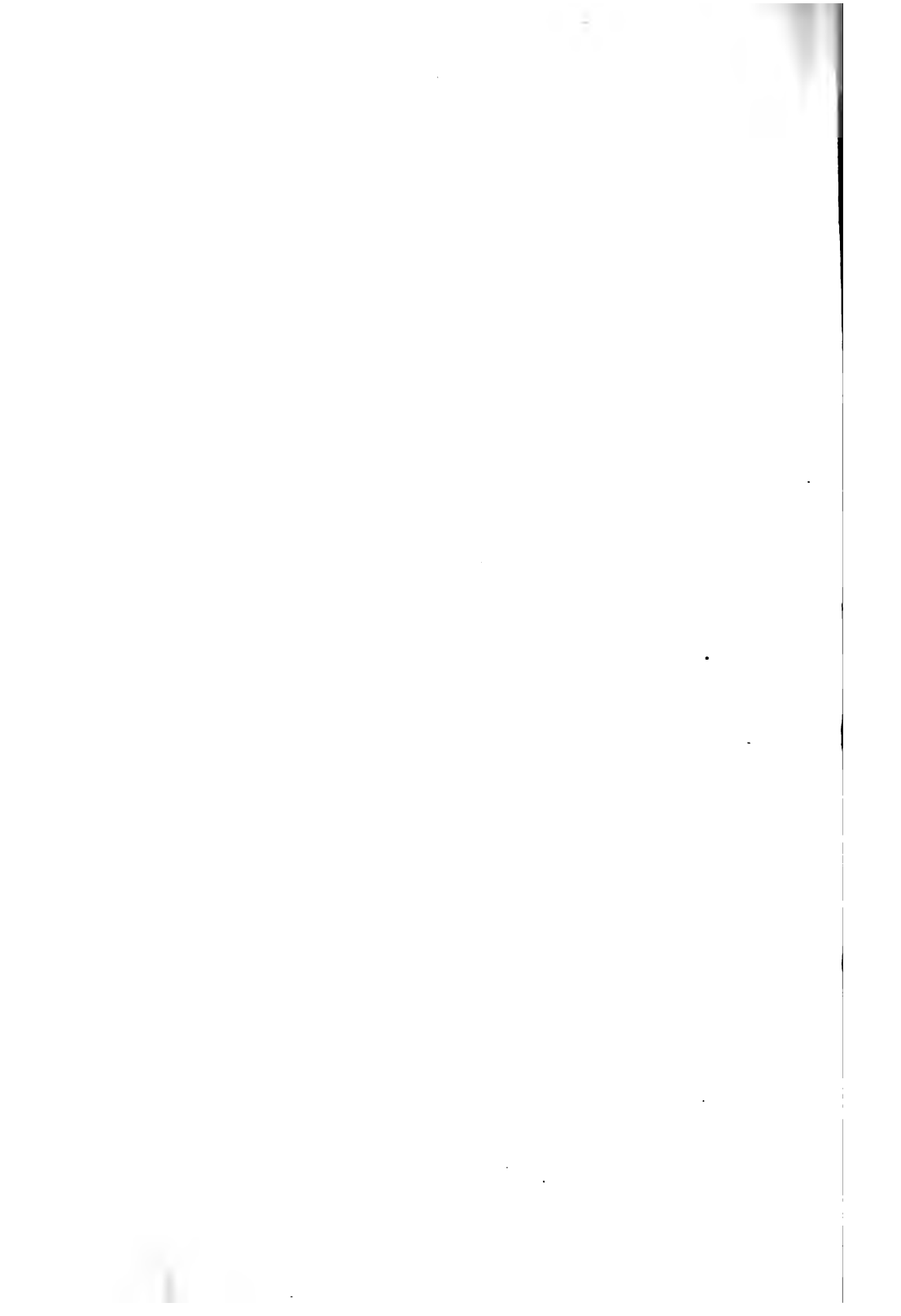


**M. C. B.—29.**

**General Arrangement for Standard Drop Test  
Machine for M. C. B. Couplers and Axles.**

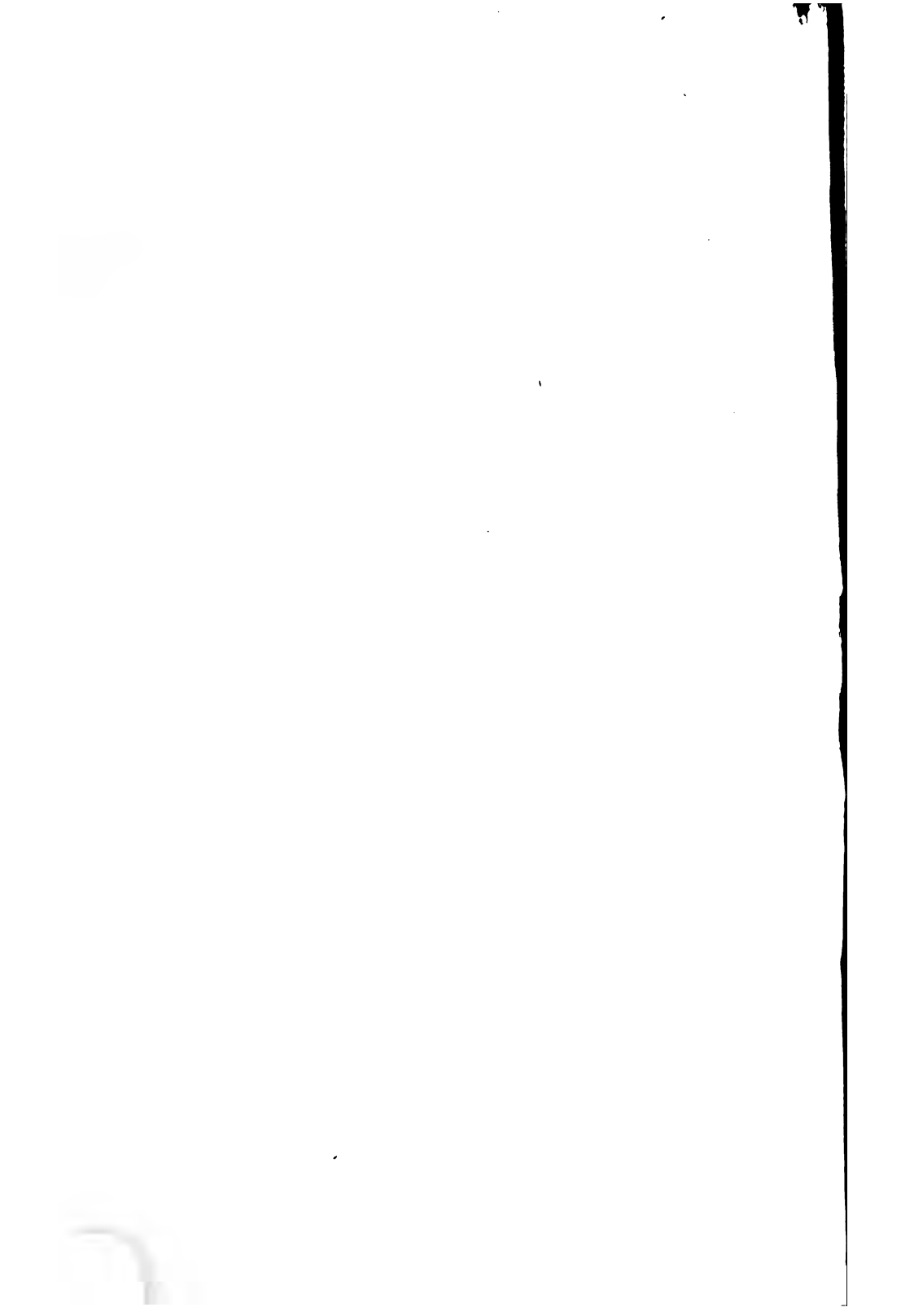


**M. C. B.—29 A.**  
Standard Jerk Test.



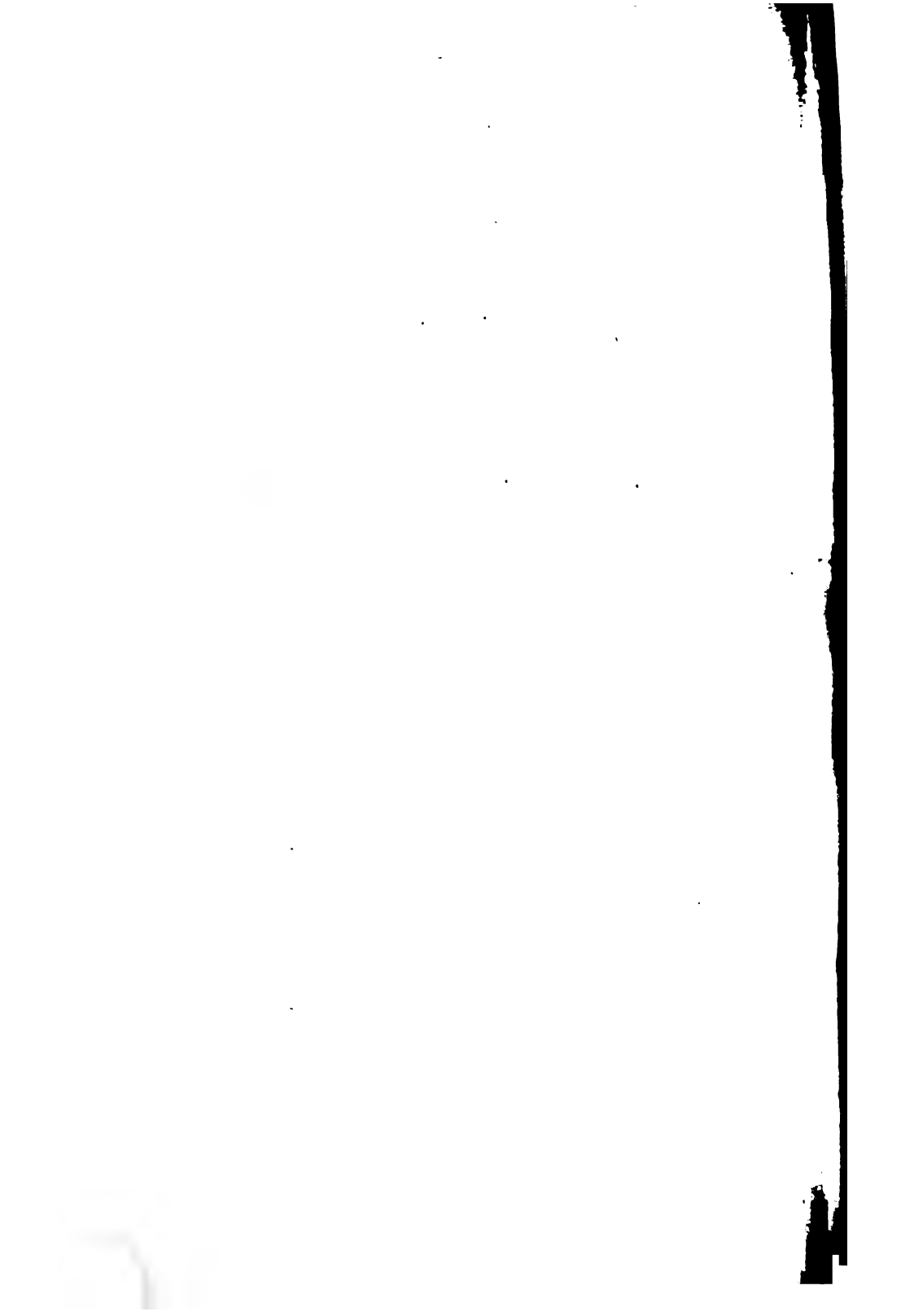
**M. C. B.—29 B.**

Standard Jerk Test.  
Standard Striking Test.



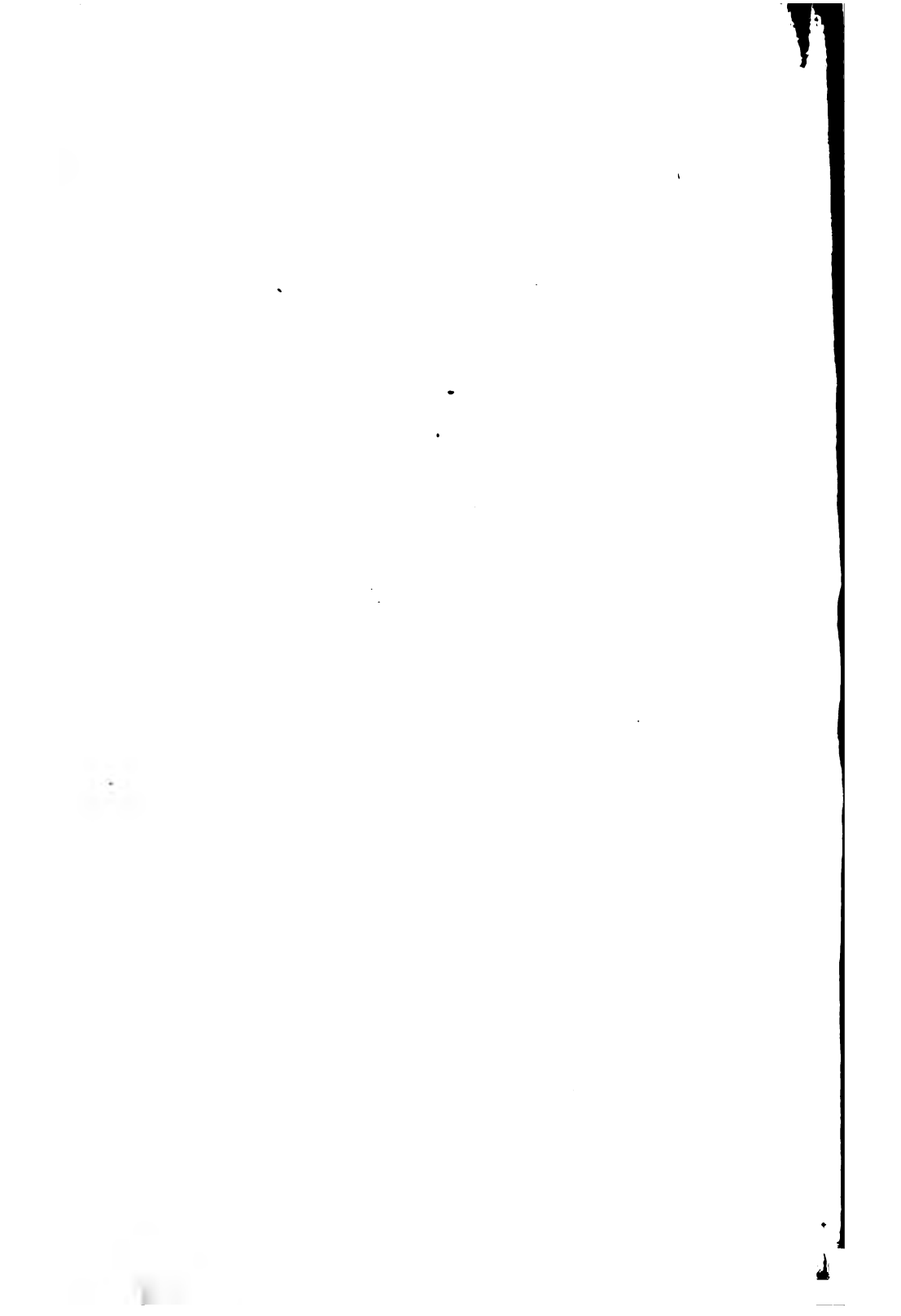
**M. C. B.—29 C.**

**Standard Face Test.**



**M. C. B.—29 D.**

**Standard Knuckle Pin Test.**



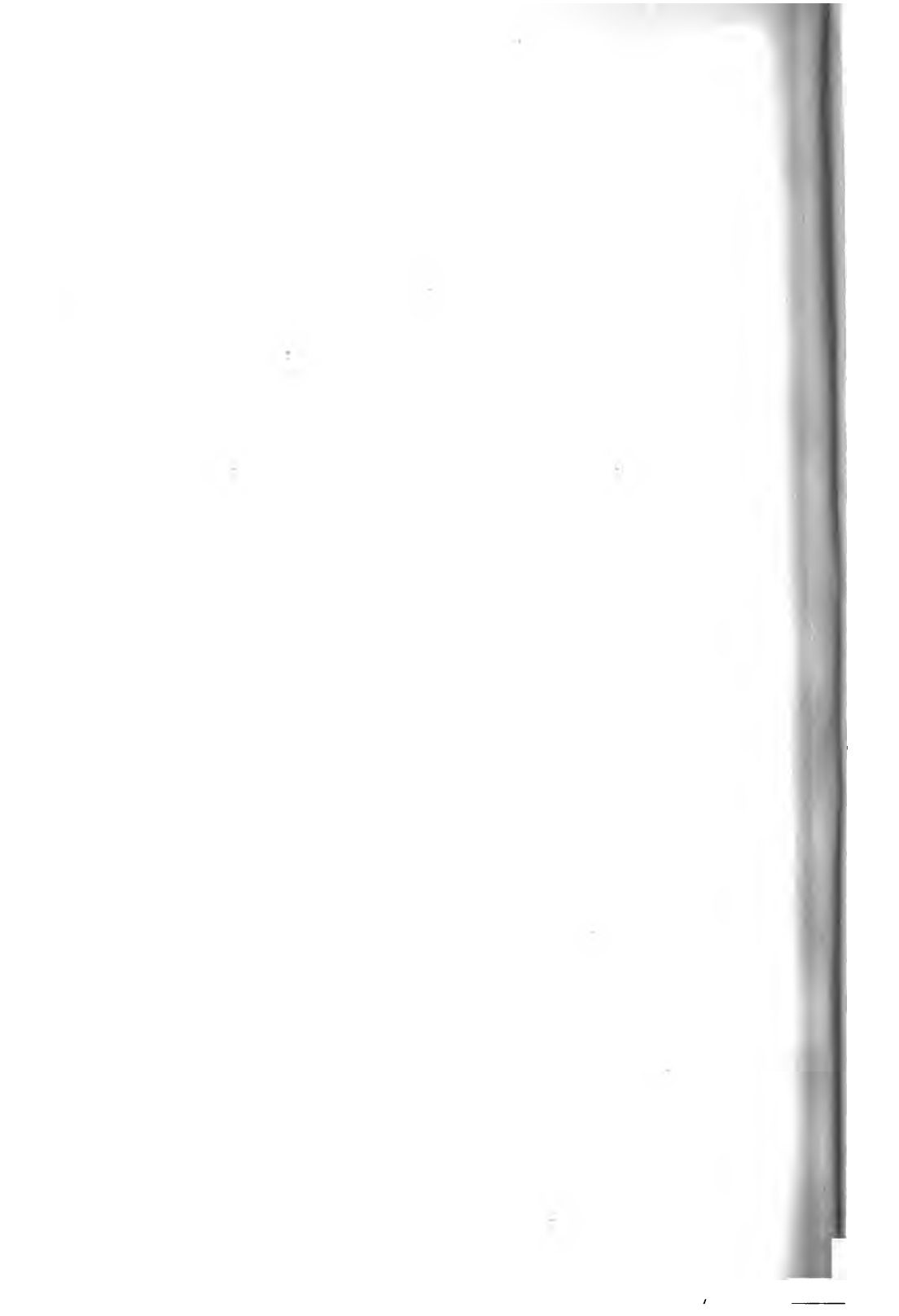
**M. C. B.—29 E.**

**Standard Separate Knuckle Test.**



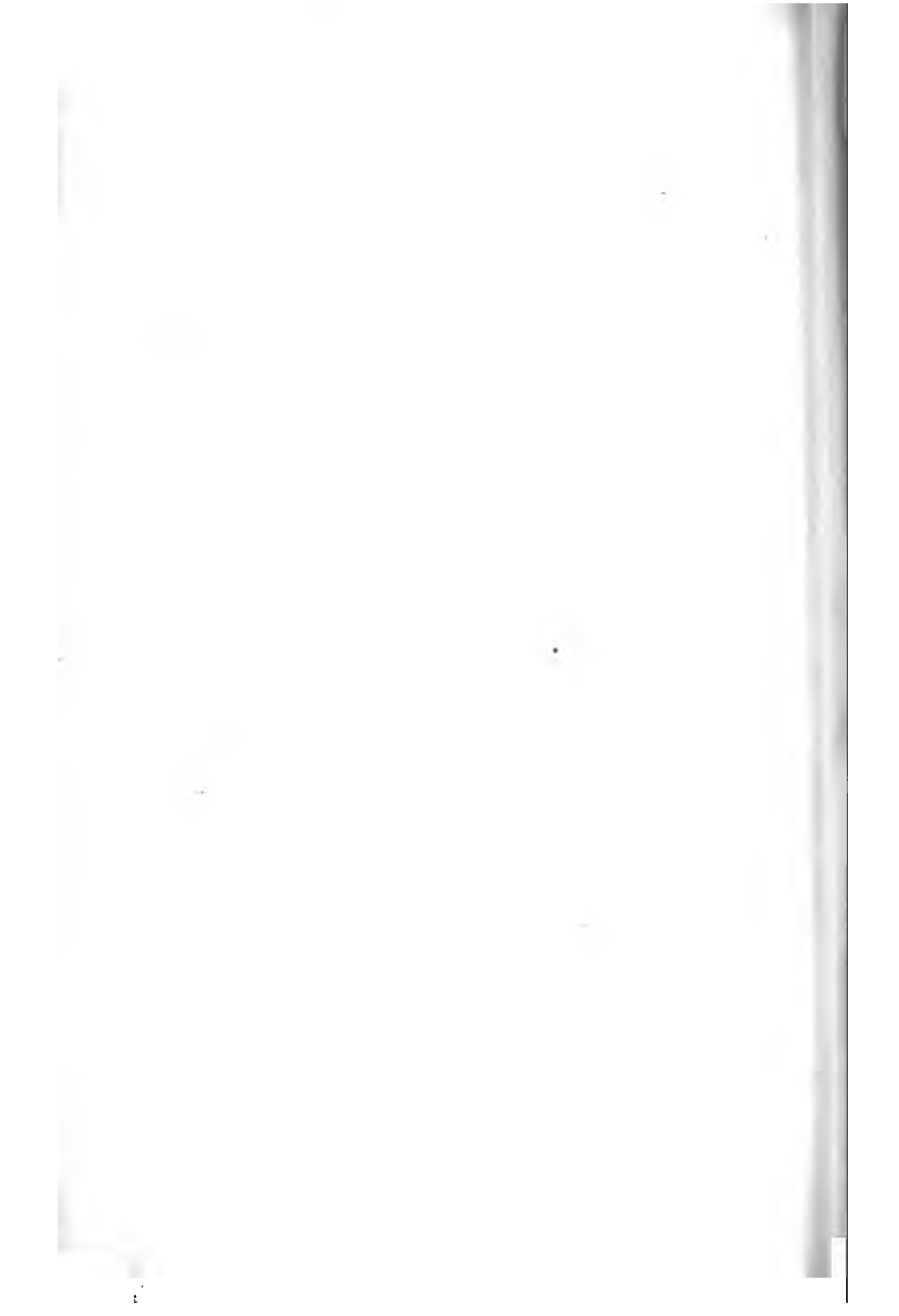
**M. C. B.—30.**

Standard Box Car Outside Hung Side Door.



**M. C. B.—30 A.**

Standard Box Car Flush Side Door.



**M. C. B.—A.**

Recommended Practice  
for  
Journal Box and Contained Parts.  
For Journal 6 by 11 Inches.  
For Freight Cars.



**M. C. B.—A1.**

Recommended Practice  
for  
Journal Box for Freight Cars.  
For Journal 6 by 11 Inches.



**M. C. B.—A2.**

Recommended Practice  
for  
Journal Bearing, Wedge and Lid.  
For Journal 6 by 11 Inches.



**M. C. B.—A3.**

Recommended Practice  
for

Journal Bearing and Wedge Gauges.

For Journal 6 by 11 Inches.

Dust Guard for Journal Box 6 by 11 Inches.



**M. C. B.—C.**

Recommended Practice  
for

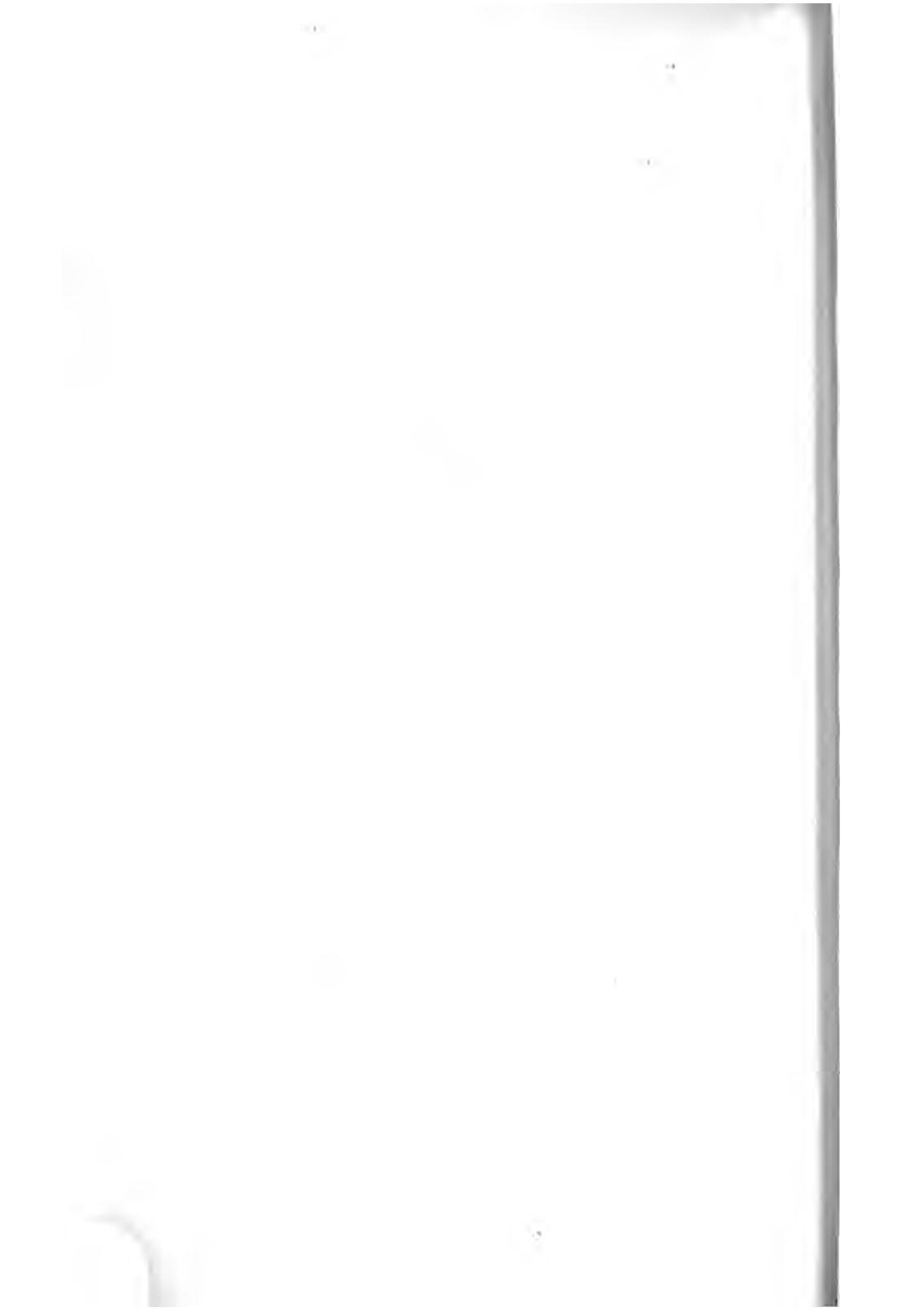
Minimum Thickness for Steel Tires.  
Wheel Tread and Flange for Steel and Steel  
Tired Wheels.

Rotundity and Plane Gauges for Solid Steel  
Wheels.

Tire Fastening for Steel Tired Wheels.  
Wheel Circumference Measure for Steel and  
Steel Tired Wheels.



**M. C. B.—C1.**  
**Recommended Practice**  
**for**  
**Gauge for Measuring Steel Wheels to**  
**Restore Contour.**



**M. C. B.—C2.**

Recommended Practice  
for  
Branding of Solid Steel Wheels and Details of  
Letters and Figures.



**M. C. B.—E.**

Recommended Practice  
for

Permanent Safety Chains for Wooden Under-  
frame Freight Cars.

Permanent Safety Chains for Steel Under-  
frame Freight Cars.

Temporary Stake Pockets for Gondola Cars.

Temporary Chains for Double Loads.



**M. C. B.—F.**

Recommended Practice  
for

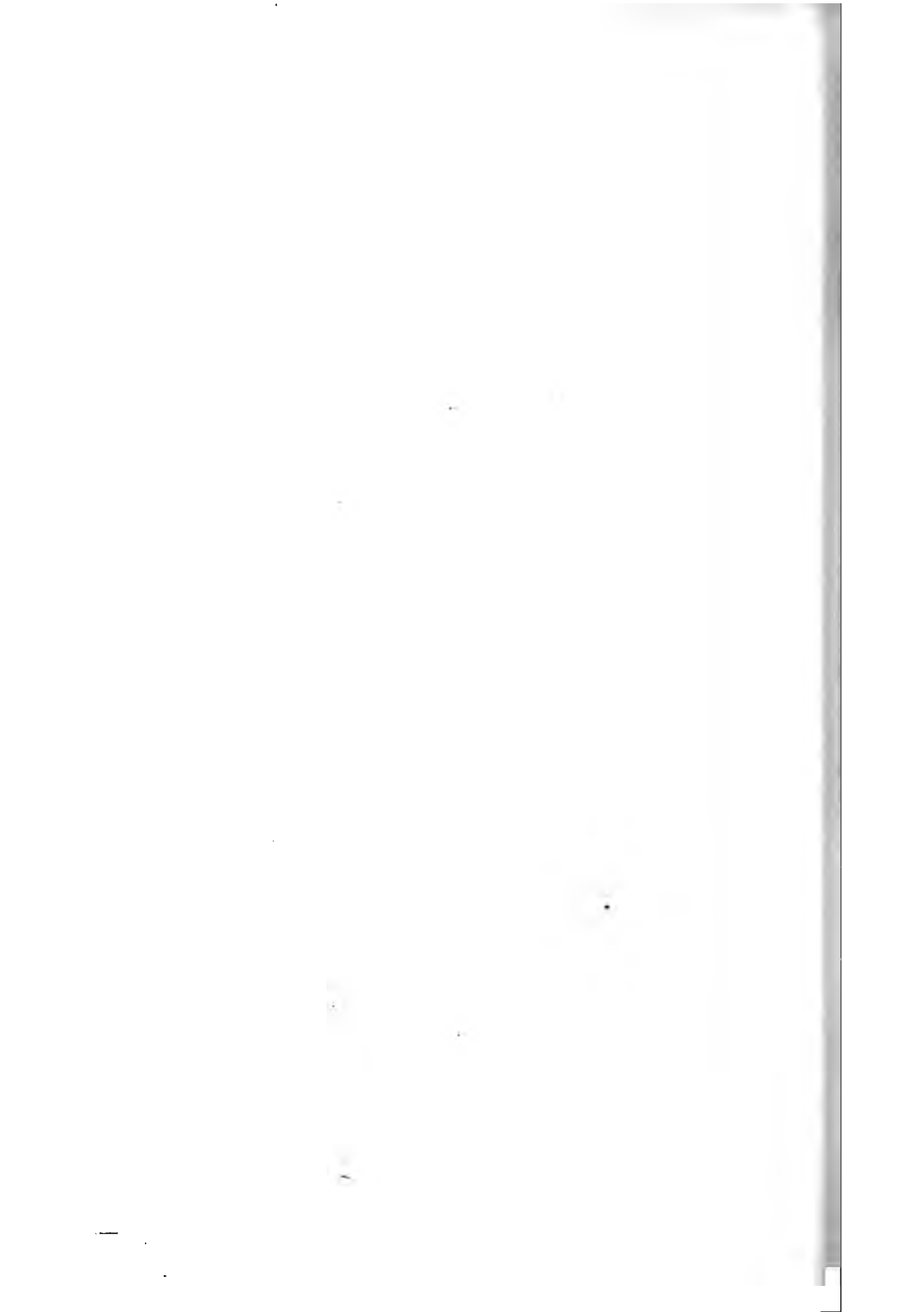
Box Car End Door.

Rounded Corners of Doors, Etc., of Stock  
Cars.

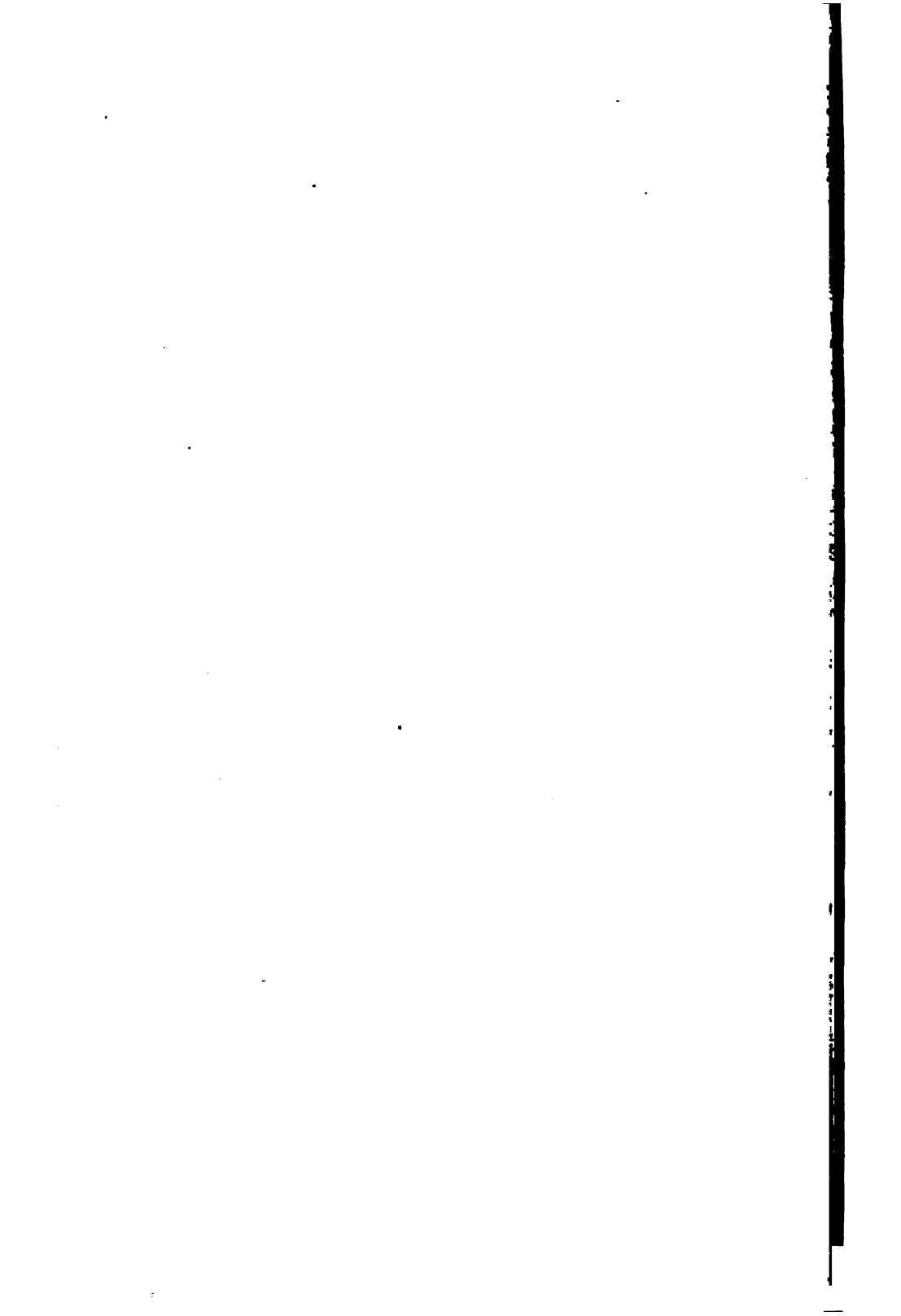
Lining for Outside Framed Cars.

End for Hopper Door Operating Shaft.

Manner of Taking Borings for Analysis of  
Axles.



**M. C. B.—H.**  
Recommended Practice  
for  
Springs and Spring Caps for Freight Car  
Trucks.



**M. C. B.—I.**

Recommended Practice  
for  
Axle Test.



**M. C. B.—J.**

Recommended Practice  
for  
High Speed Foundation Brake Gear for  
Passenger Service.  
Schedule for 6-wheel Trucks.



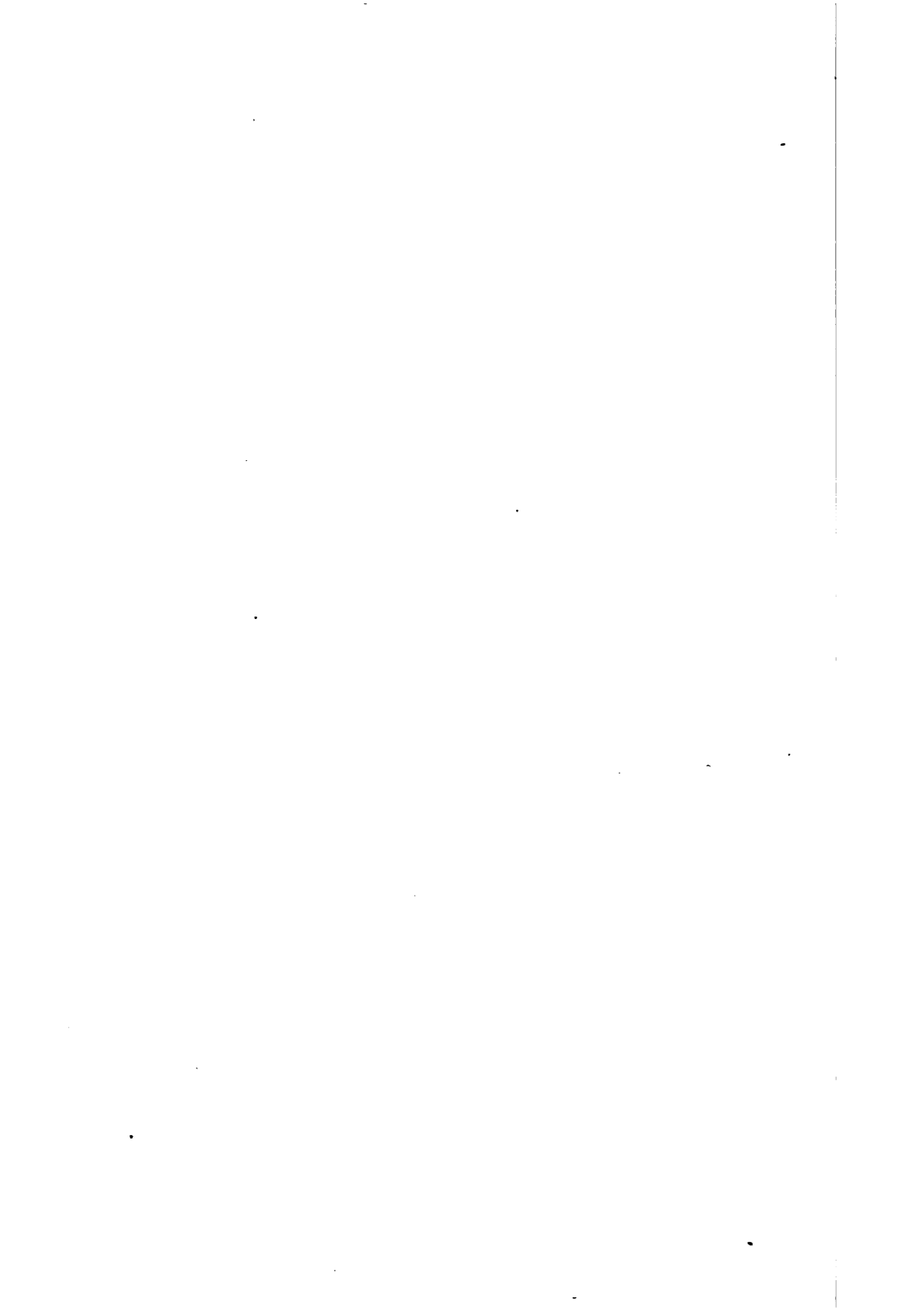
**M. C. B.—K.**

Recommended Practice  
for  
High Speed Foundation Brake Gear for  
Passenger Service.  
Schedule for 4-wheel Trucks.  
Framing of Box Cars.



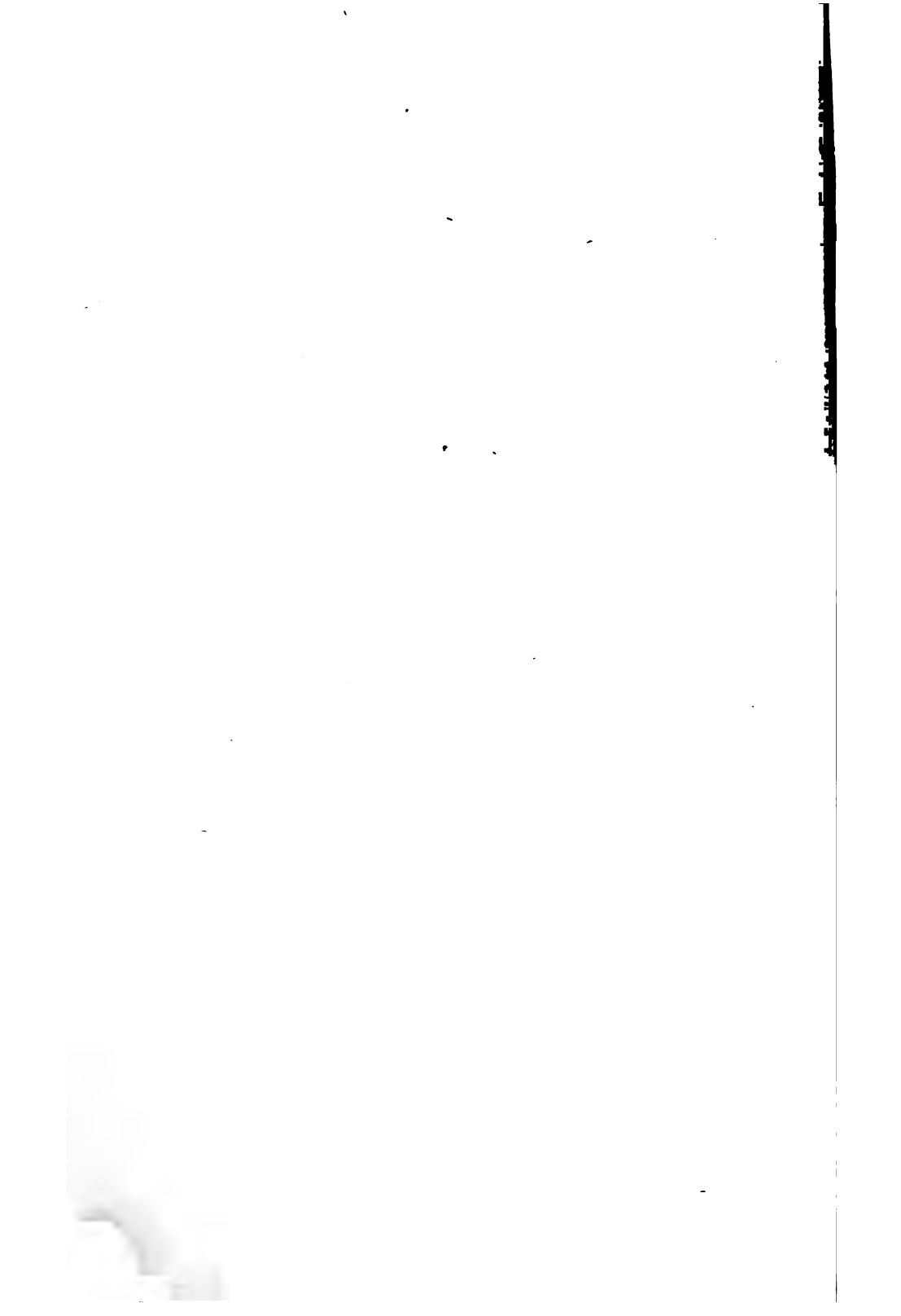
**M. C. B.—L.**

Recommended Practice  
for  
High Speed Foundation Brake Gear for  
Passenger Service.  
Schedule for 4-wheel Trucks.



**M. C. B.—N.**

Recommended Practice  
for  
33-inch Cast-iron Wheels for Cars of Maxi-  
mum Gross Weight Not to Exceed  
112,000 Lbs.



**M. C. B.—O.**

Recommended Practice  
for  
33-inch Cast-iron Wheels for Cars of Maxi-  
mum Gross Weight Not to Exceed  
132,000 Lbs.



**M. C. B.—P.**

Recommended Practice  
for  
33-inch Cast-iron Wheels for Cars of Maxi-  
mum Gross Weight Not to Exceed  
161,000 Lbs.



**M. C. B.—Q.**

Recommended Practice  
for

Location of Air Brake Cylinders and Reser-  
voirs on Box and Other Clear Bottom  
Cars, and Drop and Hopper Bot-  
tom Gondola Cars.

Piping for Box and Other Clear Bottom Cars.



**M. C. B.—Q 1.**

Recommended Practice  
for

Steam and Air Connections for Passenger  
Cars.

Steam Hose Couplings.

Position of Air Brake Hose Label on Mounted  
Hose and Bolting Lugs of Clamps.



**M. C. B.—R.**

**Recommended Practice  
for**

**33-inch Solid Steel Wheels for  $4\frac{1}{4}$  by 8, 5 by 9,  
 $5\frac{1}{2}$  by 10 and 6 by 11 inch Axles.**



**M. C. B.—S.**

**Recommended Practice**

**for**

**36-inch Solid Steel Wheels for  $4\frac{1}{4}$  by 8, 5 by 9,  
 $5\frac{1}{2}$  by 10 and 6 by 11 inch Axles.**



**M. C. B.—T.**

Recommended Practice  
for

38-inch Solid Steel Wheels for  $4\frac{1}{4}$  by 8, 5 by 9,  
 $5\frac{1}{2}$  by 10 and 6 by 11 inch Axles.



**M. C. B.—U.**  
Recommended Practice  
for  
Train Line Connectors for Electric Lighting.



**M. C. B.—U1.**

Recommended Practice  
for  
Charging Receptacle and Details for Electric  
Lighting.



**M. C. B.—U 2.**

Recommended Practice  
for  
Charging Receptacle Details for Electric  
Lighting.



**M. C. B.—U 3.**

**Recommended Practice  
for  
Charging Receptacle Details for Electric  
Lighting.**



**M. C. B.—U 4.**

**Recommended Practice  
for  
Application of Fuse Block for Electric  
Lighting.**

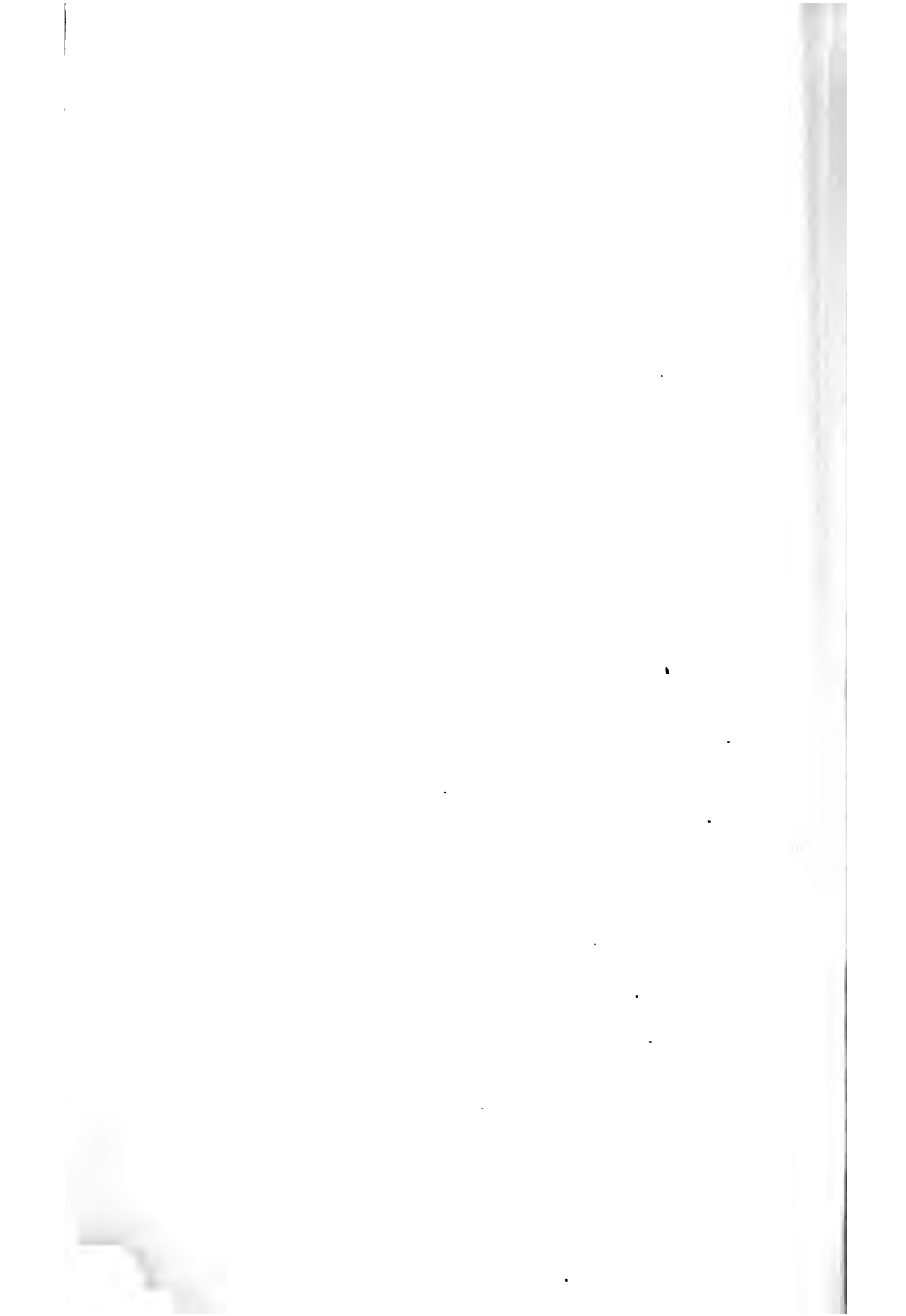


**M. C. B.—U 5.**  
**Recommended Practice**  
**for**  
**Fuse Block for Electric Lighting.**



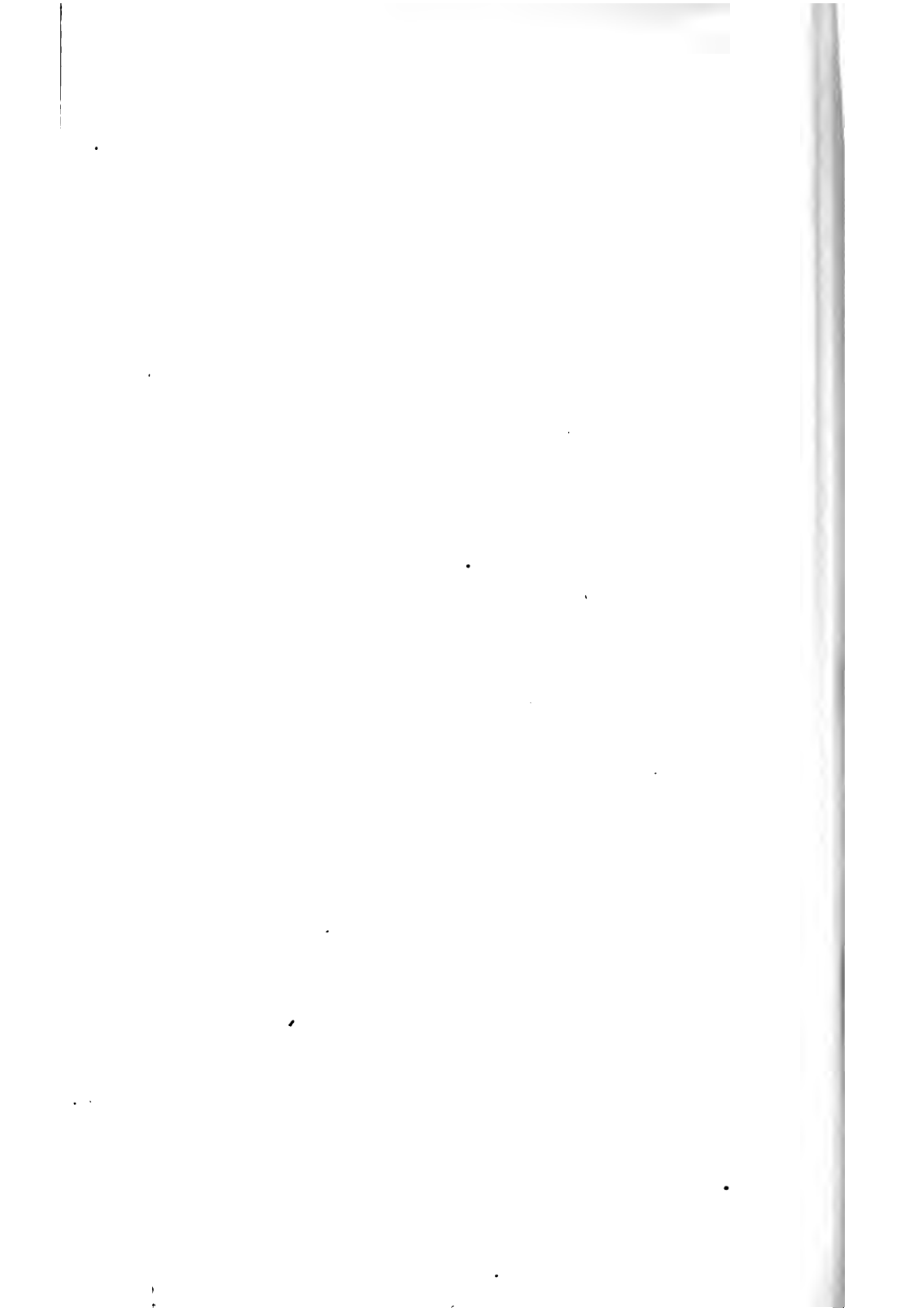
**M. C. B.—U6.**

**Recommended Practice  
for  
Double Compartment Tanks for Lead Storage  
Batteries for Electric Lighting.**



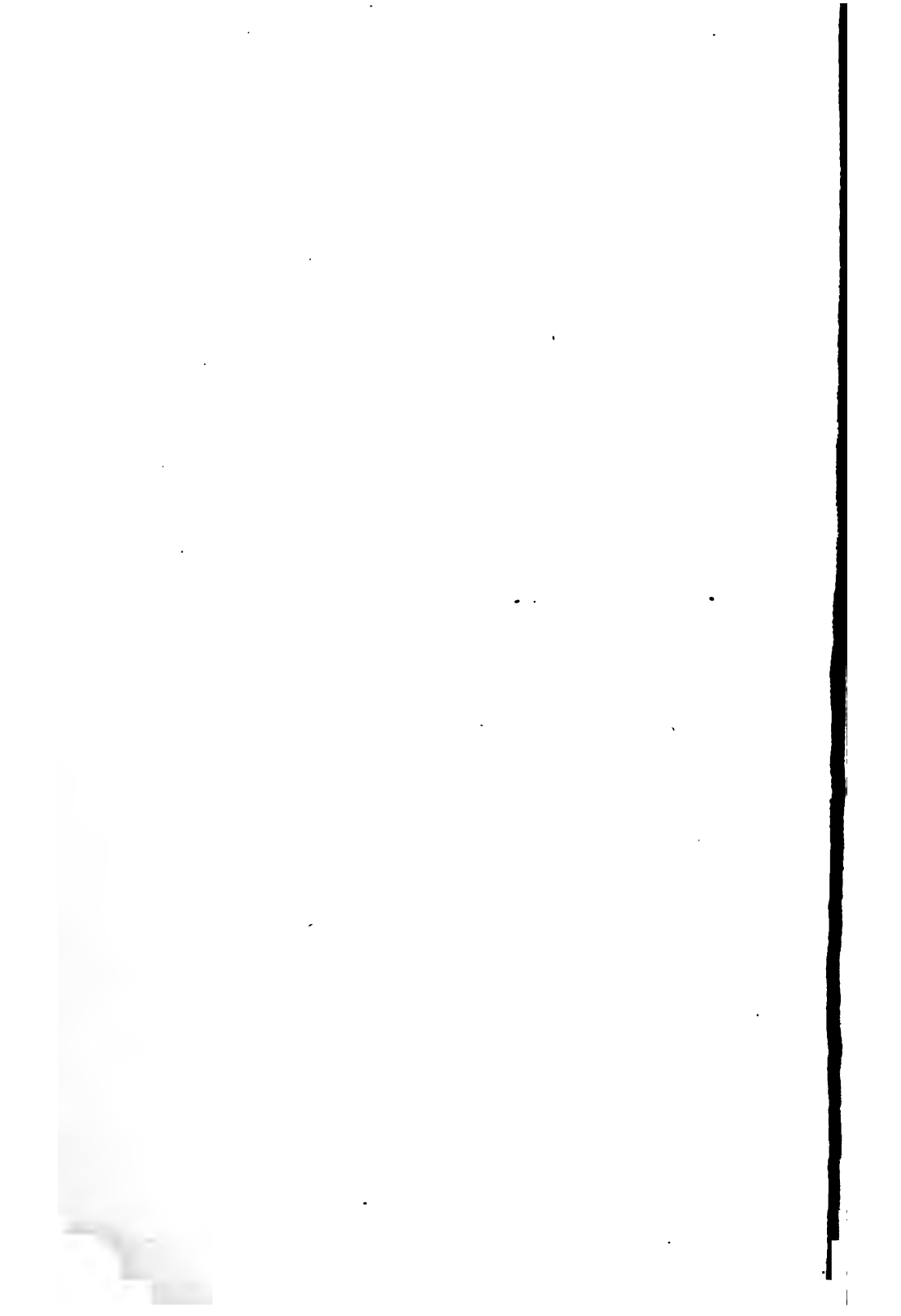
**M. C. B.—U 7.**

Recommended Practice  
for  
Double Compartment Tank Details for Electric  
Lighting.



**M. C. B.—U 8.**

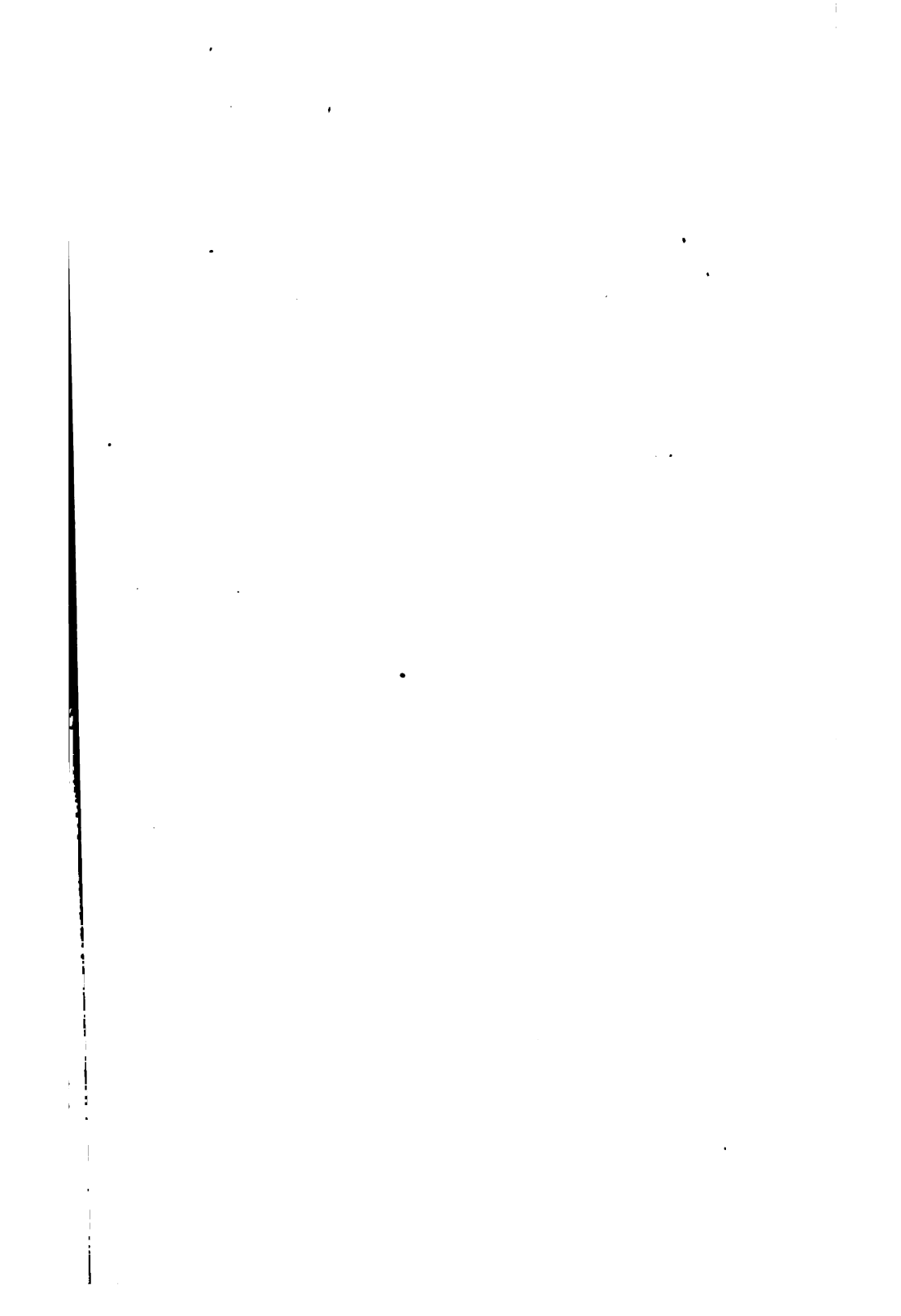
Recommended Practice  
for  
Double Compartment Tank Details for Electric  
Lighting.

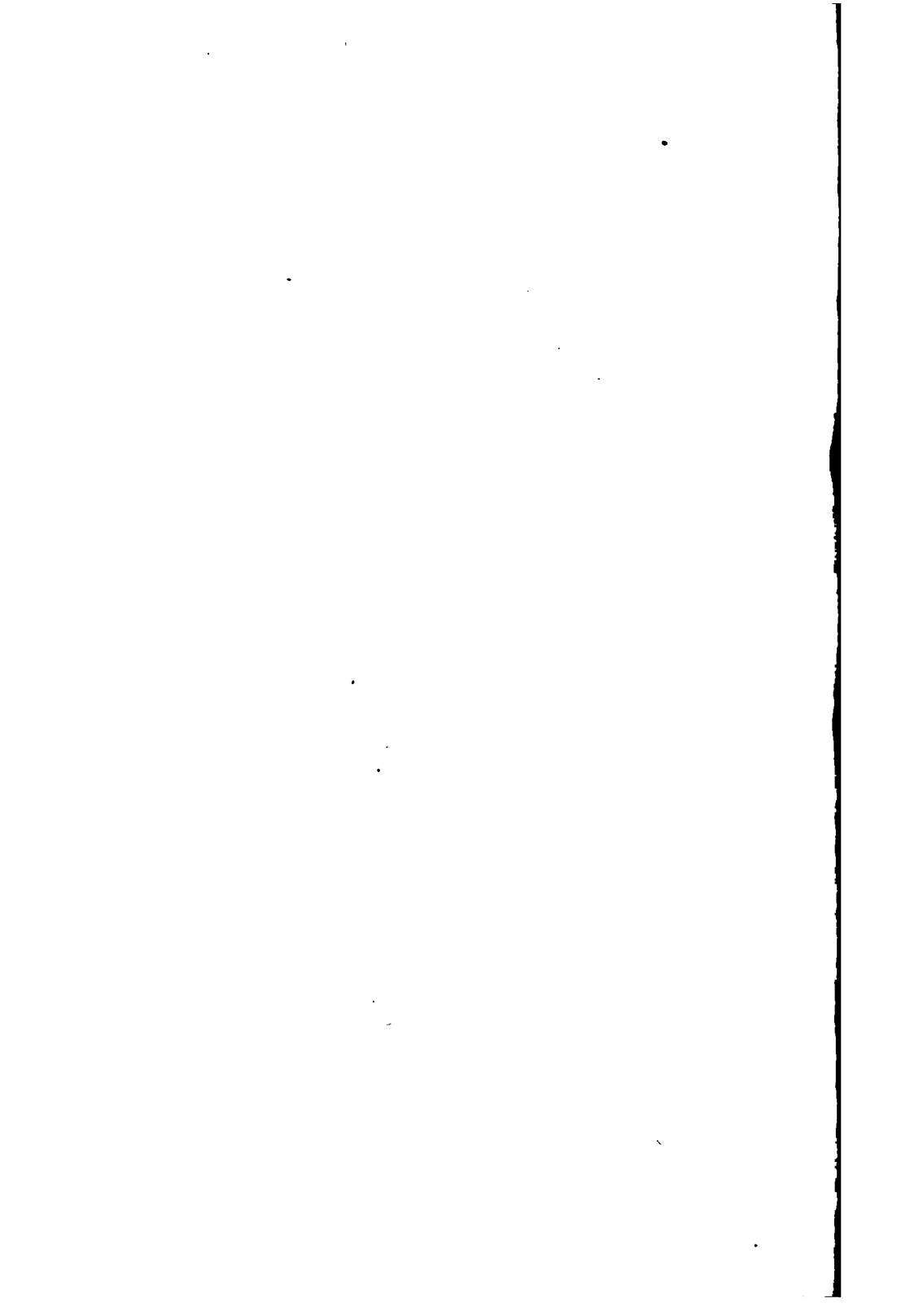


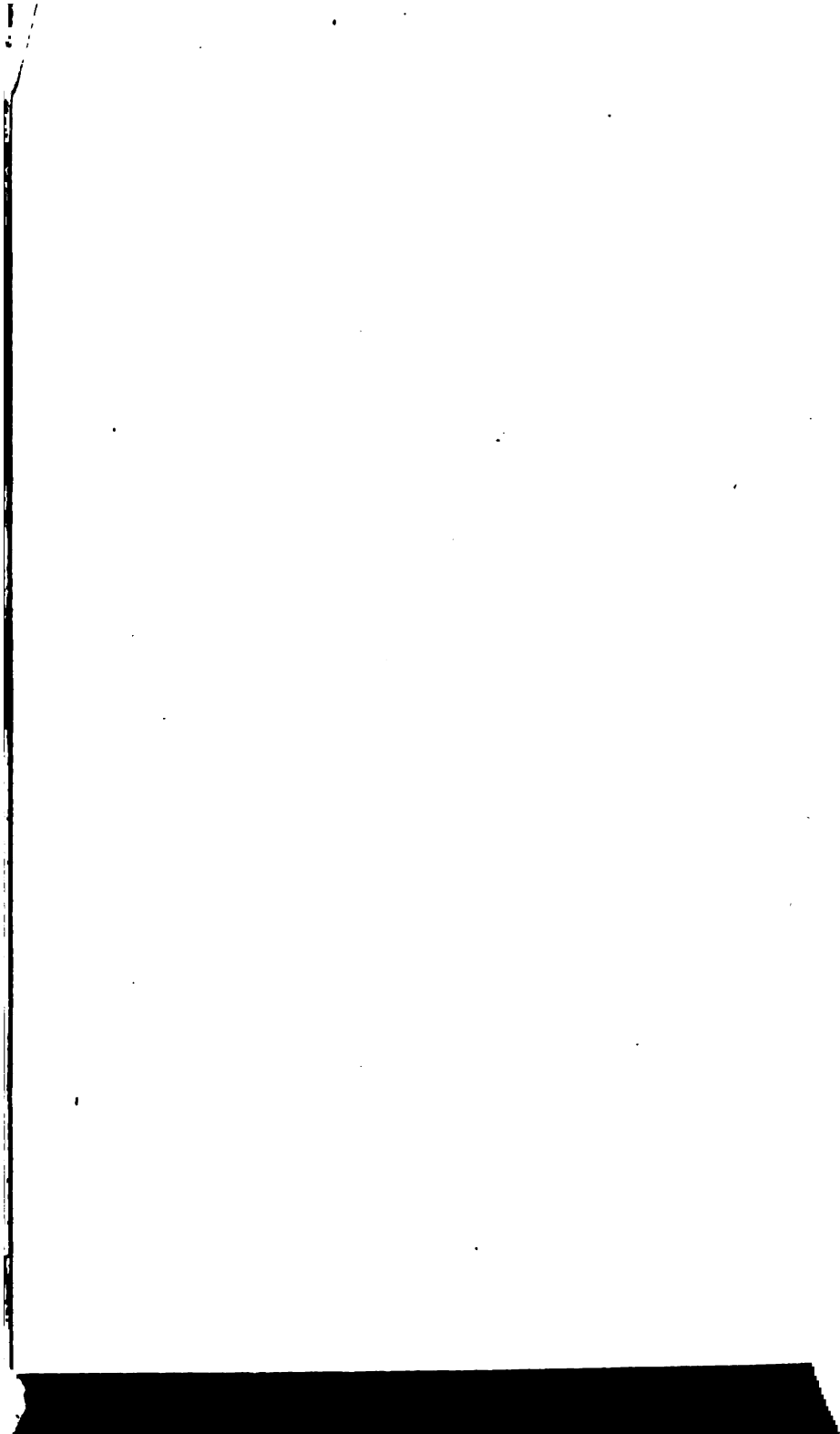
**M. C. B.—U9.**

Recommended Practice  
for  
Door Vent for Battery Box and Standard  
Lamps for Electric Lighting.

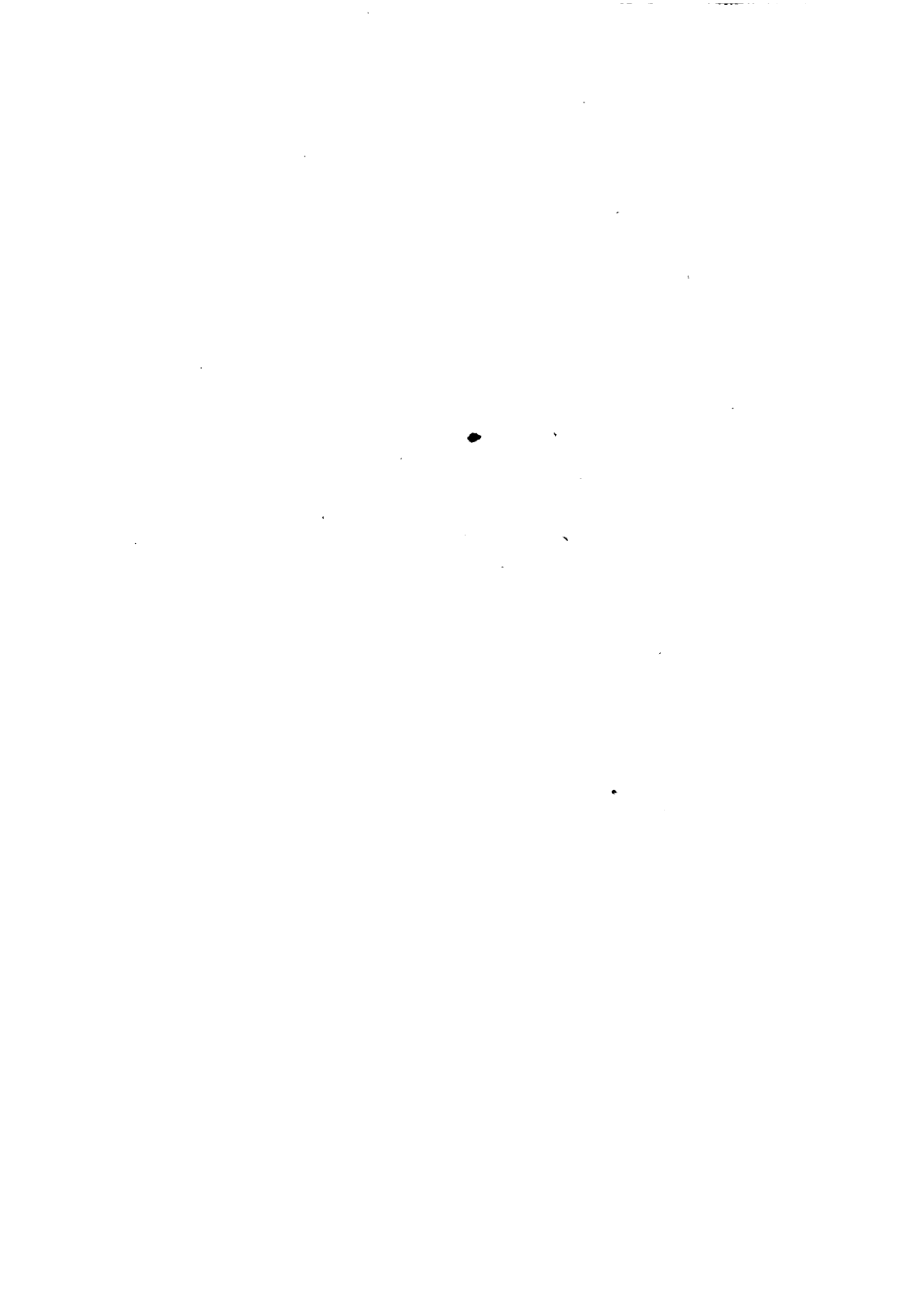












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